A

Moſt pleaſant Proſpect Into the Garden of Naturall Contemplation, to behold the naturall cauſes of all kinde of Meteors:

As well fierie and airie, as watrie and earthly: of which ſort the blazing Starres, ſhooting Starres, Flames in the Aire, &c. Thunder, Lightning, Earthquakes, &c. Raine, Dew, Snow, Clouds, Springs, &c. Stones, Metals, and Earths: To the glorie of God, and the profit of his creatures.

By *W. Fulke* Doctor of Divinitie.

Praiſe the Lord vpon earth, Dragons, and all Deepes, Fire, Haile, Snow, Ice, Winds and Stormes that doe his will. Pſal. 148.

The ſecond Edition corrected and amended.

LONDON,
Printed by *Iohn Haviland*, and are to be ſold by *Iames Boler* dwelling at the Marygold in *Pauls* Church-yard. 1634.

406:02

The Table.

The first booke. *Folio* 1

WHy Meteors be called, Vnperfitly mixed. 1
Why they be called, Perfitly mixed. 2
The generall cauſe of all Meteors, and firſt, of the materiall cauſe, ibid.
The places in which they are generated. 5

The ſecond booke, of fiery Meteors. 6

The generation of the Impreſsion, called, Burned ſtubble, or, Sparkles of fire. 7
Torches. ibid.
Daunсing or leaping Goates, ibid.
Shooting and falling Starres. ibid.
Burning candles. 8
Burning beames and round pillers. ibid.
Burning Speares. 9
Shields, Globes, or Bowles. ibid.
Lampes. ibid.
Flying Dragons, or fire Drakes. 10
The Pyramidall piller, like a Spyre, or broched ſteeple. 11
Fire ſcattered in the ayre. ibid.
Lights that goe before men, and follow them

them a broad in the fields in the night season. ibid.
Helena, Castor and Pollux. 13
Flames that appeare upon the hayres of men and beasts. 14
Comets, or blazing starres. ibid.
Apparitions. 16
Colours wide gapings, and deepe holes, which appeare in the clouds. 17
Wide gaping. ibid.
Round opening Hiatus. ibid.
The third booke, of ayry impressions. 17
Of windes. 18
Earthquakes. ibid.
Divers kindes of Earthquakes. 20
How so great windes come to bee under the earth. 22
The signes and tokens that goe before an earthquake most commonly. ibid.
Thunder 23
Lightning. 25
Fulgetrum, 26
Coruscation. ibid.
Fulgur. 27
The fourth kind, called Fulmen. ibid.
The first kind. 28
The second kind. 29
The third kind. ibid.

The

The maruailes of lightning, and their causes. 30
Storme windes. 31
Whirlewindes. 32
The fired whirlewinde. 33
Circles. 34
The Rayncbow. 35
The milke way, called of some, The way to Saint Iames and Watling street. 38
Beames or streames of light appearing through a cloud. 40
Of many Sunnes. 41
Many Moones. 42
Wonderfull apparitions. 44
The fourth booke, of watry impressions. 46
Of cloudes. ibid.
Mists. 47
Empty cloudes. 48
Raine. 49
The signes of raine. 50
Monstrous or prodigous raine. 51
Dew. 53
Hoare frost. 54
Haile. ibid.
Springs and Riuers. 56
Fountaines, Brookes, Riuers. ibid.
Lakes. 57

Hote baths. ibid.
The diuers taſtes that are perceiued in welles. ibid.
A recytall of ſuch Riuers and Springs, as haue maruailous effects, whereof no naturall cauſe can be aſſigned by moſt men, although ſome reaſon in a fewe may be found. 58
Of the Sea. 60
The ſaltneſſe of the Sea. 61
The ebbing and flowing thereof. ibid.

The fifth booke, of earthly Meteors, or bodies perfitly mixed. 62
Of Earths. ibid.
Liquors concreate. 63
Metals. 65
Gold. ibid
Siluer. 66
Copper. 67
Tynne. ibid.
Lead. ibid.
Iron. 68
Quickſiluer. ibid.
Stones. 69
The diuers kindes of ſtones. ibid.
The vertue of ſtones. 70

FINIS.

FOr as much as wee entend in this Treatise, to declare the causes of all those bodies, that are generated in the earth, called Fossilia, as well as those other Impressions, named of their height Meteora (which no writer hitherto hath done, that wee haue seene) the common definition giuen by most Writers, in no wise will serue vs and whether wee may borrow the name of Meteoron, to comprehend the whole subiect of our worke, we are not altogether out of doubt, although the Philosopher deriuing it from doubtfulnes, giueth vs some colour so to take it, & peraduenture we might be as well excused to applie it to Minerals, as other authors are to vse it for earthquaks yet to auoide all occasions of cauilling at words, we shall both define and also describe the subiect of our matter on this maner: it is a body compound without life naturall: and yet to stoppe one hole, because here wanteth the name of the thing to bee

Aristotles.

defined, it is no new thing to thē that haue read Aristotles workes, to find a definition of that whereof there is no name. But whatnæd you be so precise (will some man say:) meane you so to proceed in al your discourse: no verily, but because many of quick iudgement, not considering the stile to be attempered to the capacitie of the readers, will impute the plainenesse to the ignorance of the Authors, we thought good in ỹ beginning to pluck ỹ opinion out of their minds (that as the common saying is) they may know, we haue skill of good maners, though we little vse them.

The Meteors are deuided after three maner of waies: first, into bodies perfectly and imperfectly mixed: Secondly, into moyst impressions and drie: Thirdly, into fiery, ayry, watry, and earthly. According to this last diuision, we shall speak of them in foure bookes following: but first we must be occupied a little in the generall description of the same, that afterward shall be particularly intreated of.

Why they be called vnperfectly mixed.

They are called vnperfectly mixed, because they are very soone changed into another thing, and resolued into their proper

proper elements of which they doe most consist, as doe all impressions, fyrie, ayrie, watrie: as snow into water, cloudes into water, &c.

Why they be called perfectly mixed.

The last sort, namely earthlie Meteors, are called perfectly mixed, because they will not easily be changed and resolued from that forme which they are in, as be stones, metalles and other mineralles.

According to the qualitie of the matter, they are divided into moist & drie impressions, consisting either of Vapors or exhalations. Vapors are called moist, and exhalations drie, which termes must be well noted, because they must be much used.

Of the generall cause of all Meteors, and first of the materiall cause.

The matter wherof ỳ most part of Meteors doth consist, is eyther water or earth: for out of the water, proceed vapors, and out of the earth come exhalations. The materiall cause.

Vapor, as ỳ Philosopher saith, is a certaine watrie thing, and yet is not water: so exhalation hath a certaine earthly nature in it, but yet it is not earth. What be vapors & what exhalations.

For the better understanding of Vapors, understand that they be, as it were

fumes or ſmokes, warme & moiſt, which will eaſily bee reſolued into water, much like to the breath that proceedeth out of a mans mouth, or out of a pot of water ſtanding on the fire. These vapours are drawn vp from the waters and waterie places by the heat of the Sun, euen vnto the middle region of the ayre, and there after diuers maner of meeting with coldneſſe, many kind of moiſt Meteors are generated, as ſometimes clouds and raine, ſometime ſnow and haile; and that ſuch Vapours are ſo drawne vp by the Sunne, it is plaine by experience: for if there be a plaſh of water on a ſmooth and hard ſtone, ſtanding in the heat of the Sunne, it will ſoone bee drie, which is none otherwiſe, but that the Sunne draweth vp the water in thinne Vapors: for no man is ſo fond to ſay, that it can ſinke into ſtone or mettall, and it is as great folly to thinke, it is conſumed to nothing: for it is a generall rule, that that which is once a thing, cannot by changing become nothing: wherefore it followeth, that the water on the ſtone, as alſo on the earth, is for the moſt part drawne vp, when the ſtone or earth is dried.

What the middle region is ſhalbe told afterward.

A generall rule.

What Exhalations be.

Exhalations are as ſmokes that be hoat and

and dry, which becauſe they be thinne, and lighter than Vapours, paſſe the loweſt and middle region of the ayre, and are carried by euen to the higheſt region, where for the exceſſiue heat, by neereneſſe of the fire, they are kindled, & cauſe many kind of impreſſions. They are alſo ſomtimes viſcoſe, that is to ſay, clammie, by reaſon whereof, they cleauing together and not being diſperſed, are after diuers ſorts ſet on fire, and appeare ſometimes like Dragons, ſometime like Goates, ſometime like candles, ſometime like ſpeares.

By that which is ſpoken of Vapours and Exhalations, it is euident, that out of the fire and ayre, no matter whereof Meteors ſhould conſiſt, can be drawne, becauſe of their ſubtiltie and thinneſſe. For all Exhalation is, by making a groſſer body more thinne: but the fire (we meane the elementall fire, and not the fire of the kitchen chimney) is ſo ſubtill and thinne, that it cannot bee made thinner: likewiſe the ayre is ſo thinne, y if it be made thinner, it is changed into fire: and as the fire, if it were made thicker, would become ayre, ſo the ayre being made groſſer, would be turned into water. Wherefore to conclude

this part, the great quantitie of matter, that causeth these Meteors, is taken out of the earth and the water. As for the aire & the fire, they are mixed with this matter as with all other things, but not so abundantly, that they may be said the materiall cause of any Meteor, though without the none can be generated. The efficient cause of all Meteors is that cause which maketh them, euen as the Carpenter is ỳ efficient cause of an house. This cause is either first or second.

The efficient cause.

The first and efficient cause is God the worker of all wonders, according to that testimonie of the Psalmist, which saith, Fire, haile, snow, ice, wind and stormie doe his will & cõmandement, he sendeth snow like woll, &c. Almightie God therefore being ỳ first, principall & vniuersall cause efficient of all naturall works & effects, is also the first cause of these effects whose profit is great, and operation marueylous.

The second cause efficient, is double, either remote, that is to say, farre off, or next of all. The farther cause of them, as of all other naturall effects, are ỳ same, ỳ Sun with the other Planets and Starrs, and the nexie heauen it selfe in which they are

moued.

moued. But chiefly, the Sunne, by whose heat all or at leastwise, the most part of the vapors and exhalations are drawne vp.

The next causes efficient as the first qualities, are heat and cold, which cause diuers effects in vapors and exhalations. But to returne to the heat of the Sunne, which is a very nere cause, it is for this purpose two waies considered.

One way, as it is meane & temperate.

Otherwise, as it is vehemēt & burning. The meane, is by which hee draweth vapors out of the water, and exhalations out of the earth, and not onely draweth thē out, but also lifteth them vp very high from the earth into the aire, where they are turned into diuers kinds of Meteors.

The burning heat of the Sunne is, by which hee burneth, dissipateth and consumeth the vapors and exhalations before he draweth them vp, so that of them no Meteors can be generated.

These two heats proceed from the Sun, either in respect of the place, or ỹ time, but most properlie according to the casting of his beames eyther directly or vndirectly.

In place where the Sunnes beames

ſtrike directly againſt the earth and the water, the heate is ſo great, that it burneth vp the Exhalations and Vapours, ſo that there are no fiery Meteors, much leſſe watery, as it is in the South parts of the world, vnder and neere to the Equinoctial line.

But in places where the beames are caſt indirectly & obliquely, and that where they are not too nigh to the direct beams, nor too farre off from them, there is a moderate heate, drawing out great abundance of matter, ſo that in thoſe Countries, many Meteors of many ſortes are generated, as in the far North parts are few but waterie impreſſions. Alſo in Autumne and Spring, are oftener Meteors ſéene, than in Summer and winter, except it be in ſuch places, where the Summer and Winter are of the temper of Spring and Autumne Let this be ſufficient for the efficient cauſes of impreſſions, as well firſt and principall, as ſecond and particular. Concerning the formall and finall cauſe, we haue little to ſay, becauſe the one is ſo ſecret, that it is knowne of no man: the other ſo euident, that it is plaine, to all men. The eſſentiall forme of all ſubſtances, Gods wiſedome

compre-

comprehendeth, the uniuersall chiefe and last end of all things, is the glory of God. Myddle endes (if they may be so called) of these impressions, are manifold profits to Gods creaturs, to make ẏ earth fruitfull, to purge the aire, to set forth his power, to threaten his vengeance, to punish the world, to moue to repentance all the which are referd to one end of Gods eternall glory, euer to be praysed. Amen.

Of the places, in which they are generated.

THe places in which Meteors are caused, bee eyther the ayre or the earth: in the ayre be generated raine, hayle, snow, dew, blazing stars, thunder, lightning, &c. In the earth be welles, springs, earthquakes, metals, minerals, &c. made, and as it were, in their mothers belly begotten and fashioned. But for the better vnderstanding hereof, such as haue not tasted the principles of Philosophie, must consider that there be foure elements, Earth, Water, Ayre, and Fire, one compassing another round about, sauing that ẏ waters by Gods comandement are gathered into one place, that the land might appeare. The highest is the speare of the Fire, which

toucheth

toucheth the hollowneſſe of the Mones heauen: the next is the ayre, which is in the hollowneſſe of the fire: the ayre within his hollowneſſe, comprehendeth the water and the earth, which both make but one ſpheare or Globe, or as the common ſort may vnderſtand it, one Ball. So each element is within another, as the ſkales of a perie are one aboue another: or (to vſe a groſſe ſimilitude) as the péeles of an Onion are one within another: after the ſame ſort frō the higheſt heauen to the earth, that is loweſt, one part that is greater compaſſeth round about another that is leſſer. But for this preſent purpoſe it is to be knowne, ẏ the aire is diuided into thrée regions, the higheſt, the middle and the loweſt. The higheſt becauſe it is next to the region of the fire, is exceéding hoate: ẏ loweſt being next the earth & the waters, is temperate, & by reperceſſion or ſtriking backe of the Sunne beames wareth hoat, & by abſence of them is made cold, being ſubiect to winter and ſummer. The middle region of the aire, is alwaies exceéding cold, partlie becauſe the ſunne beames cannot be caſt back ſo high, and partly becauſe the cold that is there, betwéene the heat aboue, and the heat beneath

What the regions of the aire be.

neath it, is so kept in, ỹ it cannot get out, so that it must nœds be excessiuely cold: for the water and the earth being both cold Elements, after the sun-setting in the night season, doe cole the aire, euen to ỹ middle region. But in the morning the sunne-rising warmeth the aire, so far as his beams which are beaten backe from ỹ earth and the water, can extend and reach, which is not so high as the middle region, & by heat on both sides is inclosed and kept, sauing that a little thereof falleth downe in the night, which the next day with much more is driuen backe againe. Wherfore this region being so cold, is darke and cloudie, in so much that some doting Diuines haue imagined, purgatory to be there in the middle region of the aire. In the highest region be generated Comets or blazing stars and such like of diuers sorts. In the middle region clouds, raine, stormes, winds &c. In the lowest region, dew, frost, hore-frost, mists, bright rods, candles burning about graues, and gallowses, where there is store of clammy, fatty, or oyly substance, also lights and flaming fiers, scene in fields, &c.

¶ And thus much for the generall causes of all Meteors.

THE

THE SECOND BOOK
of fierie *Meteors*.

A Fiery impression, is an Exhalation set on fire, in the highest or lowest region of ỹ ayre, or else appearing as though it were set on fire & burning.

They are therefore divided into flames and apparitions. Flames are they, which burne indeede, and are kindled with fire. These are discerned by foure ways: by the fashion of them, by their place, by the abundance of their matter, & by the want of their matter. Their placing is after the abundance and scarcetie of the matter whereof they consist: for if it be great, heavie and grosse, it cannot be carried so farre as the middle region of the ayre, and therefore is set on fire in the lowest region: if it bee not so great, light, and full of heat, it passeth the middle region, and ascendeth to the highest, where it is easily kindled and set on fire.

According to their diuers fashions, they haue diuers names: for they are called burning stubble, torches, dauncing or leaping Goates,

Goates, shooting or falling starres, or candels, burning beames, roūd pillers, spears, shields, Globes or bowles, firebrands, lampes, flying Dragons or firedrakes, painted pillars or brached steeples, or blazing starres, called Cometes. The time when these impressions doe most appeare, is the night season: for if they were caused in the day time, they could not be seene, no more than the starres be seene, because the light of the Sunne which is much greater, dimmeth the brightnes of thē being lesser.

Of the generation of the impression, called burned stubble or sparckles of fire.

Sparks of fire.

THe generation of this Meteor is this: when the matter of ỹ Exhalation is in all parts alike thin, but not compacted or knit together, then some part of it being caried vp into the highest Region, by the fiery heat is set on fire before another part, that cōmeth vp after it, & so being kindled by little & little, flieth abroad like sparkles out of a chimney, insomuch that the common people suppose, that an infinite number of stars fall downe, whereas it is nothing else, but the Exhalation that is thin, kindled in many parts, sparkling, as when saw-dust or cole-dust is cast into the fire.

Of

Of Torches.

Torches. TOrches or firebrands are thus generated: when the matter of ỹ erhalation is long and not broad, being kindled at one end thereof in the highest region of the aire it burneth like a torch or firebrand, and so continueth till all ỹ matter be burned up, and then goeth out, none otherwise than a Torch when all the stuffe is spent, must nées burne no longer.

Of dansing or leaping Goates.

Dauncing Goats. DAnsing Goats are caused when the erhalation is diuided into two parts, as when two torches be séene together, & the flame appeareth to leape or daunce from one part to the other, much like as bals of wild fire daunce up and downe in the water.

Of shooting and falling stars.

Shooting Stars. A Flying, shooting, or falling star, is when ỹ erhalation being gathered as it were on a round heape, and yet not throughly compacted in the highest part of the lowest region of the ayre, being kindled by the sodaine cold of the middle region, is beaten backe, and so appeareth as though a starre should fal, or slid frō place to place. Sometime it is generated after another sort for there

there is an exhalation long and narrow, which being kindled at one end, burneth swiftly, the fire running from end to end, as when a silke thread is set on fire at the one end. Some say it is not so much set on fire, as that it is direct vnder some Star in the firmament, and so receiuing light of that Starre, seemeth to our eyes to be a Starre. Indeed sometimes it may be so, but that it is not so alwaies, nor yet most commonly, as it may be easily demonstrated. The Epicurians, as they are verie grosse in determining the chiefe goodnesse: so they are verie fond in assigning the cause of this Meteor. For they say, that the starrs fall out of the firmament, and that by the fall of them, both thunder and lightning are caused: for the lightning (say they) is nothing else but the shining of that Starre that falleth, which falling into a watry cloude, and being quenched in it, causeth that great thunder, euen as hote yron maketh a noise if it bee cast into cold water. But it is euident, that the starres of the firmament cannot fall, for GOD hath set them fast for euer, hee hath giuen them a Commandement which they shall not passe. And though they should

The Epicurians opinion.

Psal. 148.

fall

fall into the cloude, yet could they not rest there, but with their weight being driuen downe, would couer the whole earth.

The greatnes of Stars.

For the least starre that is seene in the firmament, is greater than all the earth. Here will step forth some merry fellow, which of his conscience thinketh them not to be aboue three yards about, and say it is a loud lie, for hee can see within the compasse of a bullhell, more than 11. Stars. But if his bullhell were on fire 11. mile of, I demand how bigge it would seeme vnto him? He that hath any wit, will easily perceiue, that starres being by all mens confession, so many thousand miles distant from the earth, must needs be very great, that so far off should be seene in any quantitie. Thus much for the shoting or falling starres.

A proofe of the Stars greatnes.

Of burning Candels.

Burning candels.

When the Exhalation carried by into the highest part of the ayre, is in all parts thereof of equall and like thinnes, and also long, but not broad, it is set on fire and blazed like a candle, vntill the Exhalation be quite consumed.

Of burning Beames and round Pillers.

Burning Beames and round pillers

These are caused, when the Exhalation being

being long and not verie broad, is set on fire all at once, and so burneth like a great beame or logge. The difference of beames and pillers is this: for beams are when they seeme to lye in length in the ayre, but they are called pillers, when they stand right vp, the one end nærer to the earth, than the other.

Of burning speares.

BUrning speares are generated, when a great quantity of exhalations, which may be called a dry cloud, is set on fire in the middest, and because the cloud is not so compact, that it should suddenly rend, as when thunder is caused, the fire breaketh out at the edges of the cloud, kindling the thinne Exhalations, which shot out in great number like fiery speares, or darts, long & very small, wherefore they continue not long: but when they fayle, within a short while after, more fire breaking out, they shot as many more in their place: and likewise, when they are gone, other succeed, if the quantity of the matter will suffice, more than a dozen courses. This impression was seene in London, Anno Dom. 1560. the thirty day of Burning Speares.

January, at eight of the clocke at night, the ayre in all other places being very darke, but in the North-east where this cloude burned, it was as light as when the day breaketh, toward the Sunne rising, in so much, that plaine shaddow of things opposite was sæne. The edge of this cloude was in fashion like the Raynebow, but in colour very bright, and oftentimes casting forth almost innumerable dartes, of wonderfull lenght, like squibs that are cast vp into the ayre, sauing that they moued more swiftly than any squibs.

Shields. Globes or Bowles.

Of Shields, Globes or Bowles.

These Meteors also haue their name of their fashion, because they are broad, and appeare to bæ round, otherwise their generation differeth not from the cause of the like impressions before mentioned.

Lampes.

Of Lampes.

The lampe consisteth of an Exhalation ẏ is broad & thick, but not equally extended, namely, smaller at one end than at another, which being kindled about the middest thereof, burneth like a lamp. The cause why, as wel this impression, as many other, appeareth round, is not for that allwaies they are round indeed, but because the

the great distance causeth them to seem so. For euen square formes far of seeme to be round It is written, that a lamp fell down at Rome, whē Germanicus Cæsar set forth the sight of sword players.

Of flying Dragons or fire Drakes.

Flying Dragons or fire Drakes.

FLying Dragons, or as Englishmen call thē, fire Drakes, be caused on this maner. When a certaine quantity of vapors are gathered together on a heap, being very nere cōpact, & as it were hard tepered together, this lump of vapors ascending to ẏ region of cold, is forcibly beaten backe, which violence of mouing, is sufficient to kindle it, (although sōe men will haue it to be caused betweene 2. cloudes, a hote and a cold, then the highest part, which was climing vpward, being by reason more subtil & thin, appeareth as the Dragons neck, smoking, for ẏ it was lately in the repulse bowed or made crooked, to represent the Dragons belly. The last part by ẏ same repulse turned vpward, maketh the tayle, both appearing smaller, for ẏ it is further off, & also, for that the cold bindeth it. This dragon thus being caused, flieth along in ẏ ayre, & sometime turneth to & fro, if it mēt with a cold cloud to beat it back, to ẏ great

terrour of them that behold it: of whom some call it a fire Drake: some say it is the Deuill himselfe, and so make report to other. More than 47. yéres agoe, on May day, when many young folke went abroad early in the morning, I remember by ſire of the clocke in the forenoone, there was newes come to London, that the Deuill, the same morning, was séene flying ouer the Thames: afterward came word, that hee lighted at Stratford, and there was taken and set in the Stockes, and that though he would faine haue dissembled the matter, by turning himselfe into the likenesse of a man, yet was he knowne well enough by his clouen foote. I knew some then liuing, that went to sée him, and returning, affirmed, that hee was indeede séene flying in the ayre, but was not taken prisoner. I remember also, that some wished hee had beene shot at with Gunns or shafts, as he flew ouer the Thames. Thus doe ignorant men iudge of these things that they know not. As for this Deuill, I suppose, it was a flying Dragon, whereof wee speake, verie fearefull to looke vpon, as though hee had life, because hee moo-

neth,

ueth, whereas hee is nothing else but clowes and smoak: so mightie is God, that hee can feare his enemies with these and such like operations, whereof some examples may bee found in holy Scripture.

Of the Pyramidall piller like a spire or broched Steeple.

Of Spires.

THis sharp poynted piller, is generated in the highest region of the ayre, and after this sort: When the Exhalation hath much earthly matter in it, the lighter parts and thinner (as their nature is) ascending vpward, the grosser, heauier, and thicker, abide together in the bottome, and so is it of fashion great beneath, and small poynted aboue, and beeing set on fire, it is so seene, and thereof hath his name.

Of fire scattered in the ayre.

Fire scattered.

FYre scattered in ỹ ayre, or illuminations, are generated in the lowest region of the ayre, when verie drie and hote Exhalations are drawne vp, and meeting with cold clowdes, are sent backe againe, which motions doe set them a fire; whose parts being not equally thicke or ioyned together, seeme as

though fire were scattered in ỹ aire: yea sometimes, the whole aire seemeth to burne, as though it would rayne fire from heauen, & so it hath come to passe, burning both cities and townes. Then iudge how easy it was for God to raine fire vpon Sodom & Gomor, for their sins & wickednes.

Of lights that goe before men, and follow them abroad in the fields, by the night season.

Light that goeth before men & followeth them in the night.

THere is also a kind of light, ỹ is seene in the night season, and seemeth to goe before men, or to follow them, leading them out of their way vnto waters, and other dangerous places. It is also very often seene in the night, of them that saile in the Sea, and sometime will cleaue to ỹ mast of the shippe, or other high partes, sometime slide round about the shippe, and either rest in one part till it goe out, or else bee quenched in the water. This impression seene on the land, is called in Latine, Ignis fatuus. foolish fire, that burneth not, but onely feareth fooles. That which is seene on the Sea, if it bee but one, is named Helena, if it bee two, it is called Castor and Pollux.

The foolish fire, is an Exhalation kindled

kindled by meanes of violent mouing, when by cold of the night, in the lowest region of the ayre, it is beaten downe, and then commonly, if it be light, seeketh to ascend vpward, and is sent downe agayne; so it danceth vp and downe. Els if it moue not vp and downe, it is a great lumpe of glewish or oyly matter, that by mouing of the heat in it selfe, is enflamed of it selfe, as moyst hay will be kindled of it selfe. In hote and fennie Countries, these lightes are often seene, and where as is abundance of such vnctuous and fat matter, as about Churchyards, where through the corruption of the bodies there buried, the earth is full of such substance: wherefore in Churchyards, or places of common buriall, oftentimes are such lights seene, which ignorant and superstitious soles haue thought to bee soules tormented in the fire of Purgatorie. Indeed the deuill hath vsed these lightes (although they be naturally caused) as strong delusions, to captiue the mindes of men, with feare of the Popes Purgatorie, whereby he did open iniury to the bloud of Christ, which onely purgeth vs from all our sins, and deliuereth vs from all torments, both

temporall and eternall, according to the saying of the wiseman, The soules of the righteous are in the hands of God, and no torment toucheth them. But to returne to the lights, in which, there are yet two things to bee considered. First, why they lead men out of their way. And secondly, why they seeme to follow men and goe before them. The cause why they lead men out of the way, is, that men, while they take heed to such lights, and are also sore afraid, they forget their way, and then being once but a little out of their way, they wander they wot not wither, to waters, pittes, and other very dangerous places. Which, when at length they hap the way home, will tell a great tale, how they haue beene led about by a spirit in the likenesse of fire. Now the cause why they seeme to goe before men, or to follow them, some men haue said to bee the mouing of the aire, by the going of the man, which aire moued, should driue them forward, if they were before, and draw them after, if they were behind. But this is no reason at all, that the fire, which is oftentimes three or foure miles distant from the man

that

that walketh, should bee moued to and fro by that aire which is moued through his walking, but rather the mouing of the aire and the mans eyes, causeth the fire to seeme as though it moued: as the Moone to children seemeth, if they are before it, to run after them: if shee bee before them, to run before them, that they cannot ouertake her, though shee seeme to be verie neere them. Therefore these lights rather seeme to moue, than that they be moued indeed.

Of Helena, Castor, and Pollux.

Helena, Castor, Pollux.

When the like substance in the lowest region of the ayre, ouer the Sea, by the like occasion is set on fire, if it be one onely, it is called Helena, if there be two, they are called Castor and Pollux. These impressions will oftentimes cleaue to the mast, and other parts of the ships, by reason of the clamminesse and fatnesse of the matter. Helena was of the Heathen men, taken as a Goddesse, the daughter of Iupiter and Leda. Castor and Pollux were her brethren. Helena was the occasion that Troy was destroied: therefore ỹ Mariners by experience trying, that one flame

flame of fire appearing alone, signified tempest at hand, supposed the same flame to be the goddesse Helena, of whom they lōked for nothing but destruction. But when two lights are seene together, they are a token of faire weather, & good luck: the Mariners therefore beleeued, that they were Castor and Pollux, which sayling to seeke their sister Helena, being caried to Troy by Paris, were neuer seene after, and thought to bee translated into the number of the Gods that giue good successe to them that sayle, as we read in the last Chapter of the Actes of the Apostles, that the shippe wherein S. Paul sayled, had a badge of Castor and Pollux. A naturall cause why they may thus foreshew either tempest or calmnesse, is this. One flame alone may giue warning of a tempest, because that as the matter thereof is compact, and not dissolued, so it is like, that the matter of tempest (which neuer wanteth) as winde and cloudes, is still together, and not dispated, then is it like not long after to arise. By two flames together may be gathered, that as this Exhalation which is very thicke, is deuided: so the thicke

matter

matter of tempeſt is diſſolued and ſcattered abroad, by the ſame cauſe that this is diuided. Therefore not without a reaſon, the Mariner to his mates may promiſe a proſperous courſe.

Of flames that appeare upon the haires of men or beaſts.

Flames upon haires of men and beaſts.

THere is yet another kind of fiery impreſſion, which is flames of fire upon the haires of men and beaſts, eſpecially horſes. Theſe are ſometime clammy Exhalations, ſcattered abroad in the ayre in ſmall parts, which in the night, by reſiſtance of the colo, are kindled, cleauing on horſes eares, on mens heades and ſhoulders that rid or walke. In that they cleaue upon hayres, it is by the ſame reaſon, that the dew will be ſeene alſo vpon hayres or garments, whoſe woll is high, as fryeſe mantels and ſuch like. Another ſort of theſe flames, are cauſed, when mens or beaſtes bodies being chaffed, ſend forth a fat & clamy ſweat, which is in like maner kindled as ỳ ſparks of fire ỳ are ſeene when a blacke horſe is curryed. Liuius reporteth of Seruius Tullius, that as he lay aſleep, being a childe, his hayre ſeemed to bee all on a flame, which

Liuius. Seruius Tullius.

for

for all that, did not burne his haire, or hurt him. The like historie he reciteth of one Marius, a Knight of Rome, that as he made an Oration to his Souldiers in Spaine, they saw his head burning on a light fire, and hée himselfe not ware of it. Thus much concerning these flames.

Marius.

Comets or blazing starres.

Of Comets or Blazing starres.

A Comet is an Exhalation, hote and drie, of great quantitie, fat & clammie, hard compact like a great lumpe of pitch, which by the heat of the Sunne, is drawne out of the earth, into the highest region of the ayre, and there, by the excessiue heat of the place, is set on fire, appearing like a starre with a blazing tayle, and sometime is moued after the motion of the aire, which is circular, but it neuer goeth downe out of the compasse of sight, though it bée not seene in the day time for the brightnesse of the Sunne, but still burneth vntill all the matter be consumed. An argument of the greatnesse is this, that there was neuer any Comet yet perceiued, but at the last it endured 7. dayes: but much longer they haue béene seene, namely, fortie dayes long, yea, foure-

foureſcore daies, and ſome, fiue meneths together. Wherefore it muſt needs bée a wonderfull deale of matter, that can giue ſo much nouriſhment, for ſo great and feruent fire, and for ſo long a time. There are conſidered in a Comet, ſpecially the colour and faſhion, which both ariſe of the diſpoſition of the matter. There colours bee either white, ruddie, or blew. If the matter be thinne, the colour is white. If it bée meanely thicke, then is the Comet ruddie, after the colour of our fire: but when the matter is very thicke, it is blew, like the burning of Brimſtone. And as the matter is more and leſſe, after this diſpoſition: ſo is the Comet of colour, more or leſſe like to theſe thrée principall colours, ſome yellowiſh, ſome duſkiſh, ſome grénniſh, ſome watchet, &c.

In faſhion are noted thrée differences, for either they ſéeme round, with beames round about, or with a beard hanging, downeward, or elſe with a taple ſtretched out ſidelong, in length. The firſt faſhion is, when the matter is thickeſt in the middeſt, and thinne round about the edges. The ſecond is, when the Exhalation

lation is vpward thicke, and in length downeward also, meanely thicke. The third forme is like the second, saving that the tayle hangeth not downe, but lyeth aside, and is commonly longer than the beard,. The time of their generation is oftenest in Autumne or harvest. For in the spring, there is too much moysture, and too little heate, to gather a Comet. In summer, is too much heate, which will disperse and consume the matter. that it cannot be ioyned together. As for winter, it is cleane contrary to the nature of a Comet, which is hote and drie, winter being cold and moyst: therefore no time so mete as Autumne.

The temper of the 4. quarters.

Now for so much as many learned men have gone about to declare the signification of blazing starres, we will omit nothing that hath any shadow of reason, but declare what is written of them.

The signification of Comets.

Such things as are set forth of the betokening of Comets, are of two sortes: the first is of naturall, the second of ciuill or politike effects. They are said to betoken drought, barrennes of ỹ earth & pestilence.

Drought, because a comet cannot be generated without great heate, and much moysture

moiſture is conſumed in the burning of it. Barrennes, becauſe the fatneſſe of ỹ earth is drawn vp, whereof ỹ Comet conſiſteth. Peſtilence, for ſo much as this kinde of Exhalation corrupteth the ayre, which infecteth the bodies of men and beaſts.

The ſecond ſort might well be omitted, ſauing that Ariſtotle himſelfe diſdaineth not to ſeeke out cauſes for ſome of them. Generally it is noted of all Hiſtoriographers, that after the appearing of Comets, moſt commonly followed great and notable calamities. Beſide this, they betoken (ſayth ſome) warres, ſeditions, changes of common wealths, and the death of Princes and noble men. Ariſtotle.

For what times Comets do ſhine, there be many hote and dry Exhalations in the ayre, which in dry men kindle heat, wherby they are prouoked to anger: of anger commeth brawling, of brawling, fighting & war, of warre, victory: of victory, change of common wealths. Then alſo Princes, liuing more delicately than other men, are more ſubiect to infection, therefore die ſooner than other men. If it were lawfull to reaſon of this ſort, we might enduce them to betoken, not only theſe few things, but all other things that chance in the world.

Yet

Yet these predictions haue a shew of reason, though it bee nothing necessarie: but it is a word, to see, how the Astrologians dote in such deuices. They are not ashamed, to an earthly substance, to ascribe an heauenly influence, and in order of iudgement to vse them as very starres. Surely, by as good reason as to the celestiall starre, they attribute diuine influences and effects. But this their folly hath beene sufficiently detected by diuers godly and learned men, and this place requireth no long discourse thereof. Wherefore this shall suffice, both for the naturall causes of blazing starres, and also, for all flames in generall. It followeth therfore, that with like breuity wee declare the causes of fiery apparitions.

Of Apparitions.

Apparitions

AN Apparition, is an Exhalation in the lowest or highest region of the ayre, not verily burning, but by refraction of light either of the Sunne or the Moone, seemeth as though it burned. Which appearance of colour, riseth not of the mixtion of the foure qualities, as it doeth in bodies perfectly mixed, as hearbes stones,

ſtones, &c. but onely the falling of light vpon ſhadow. The light is in ſtead of white, & the ſhadow or darknes in ſtead of black. Theſe diuerſly mixed according to the diuers diſpoſition of the Exhalation, which miniſtreth variety by thickneſſe or thinneſſe, cauſe diuers colours.

There be commonly receited three kinds of fyry apparitions.

Colours, wide gapings, and deepe holes, which appeare in the cloudes.

Of colours.

COlours are here meant, when there is nothing elſe to be noted, but ỹ colours of the clouds, and they are cauſed (as it is ſayd) by caſting the light into the ſhadowy clouds, according as it exceedeth more or leſſe in thickneſſe, whereof ſome bee very bright white, & that is when the Exhalation is very thin: ſome yellowiſh, when ỹ Exhalation is thicker: ſome ruddy, when it is meanly thick; and very black, when it is very thick. The red and ruddy colours are ſeene only in the morning & euening, when the light of the Sunne is not in his full force, for at other times of the day, his light is to vehement, cleare, ſtrong, and pearcing. Thus much of colours. Colours in the ayre.

Of wide gaping.

Wide gaping of clouds in the ayre.

WIde gaping is caused, when an Exhalation is thicke in the midst, and thin on ẏ edges, then the light being receiued into it, causeth it to appear as though the sky did rend, and fire breake out of it.

Of round opening Hiatus.

Round opening in the ayre.

THese holes called Hiatus, differ from wide gapings, in nothing, but ẏ they be lesse, & therefore seeme as though they were déepe pits or holes, and not rending or gaping, and these be those apparitions that appeare fiery, & yet be not so indéed. Therefore let this bée sufficient to haue shewed the naturall causes of all fiery Meteors.

The third Booke of Ayry *impressions.*

UNder the name of ayry impressions, be cōprehended such Meteors, whose matter is most of the aire. Of this sort be windes, earthquakes, thūder, lightnings, storme windes, whirlewindes, circles, rainebowes, the white circle, called of some, Watling street, many Sunnes, many Moones.

Of

Of windes.

THe wind is an Exhalation hot and dry, drawne vp into ỹ ayre by the power of the Sun, & by reason of the waight thereof being driuen downe, is laterally or sidelongs caried about the earth, & this definitio is to be vnderstãded, of general winds that blow ouer all the earth, or else some great regions: but beside these, there be particular winds, which are known but only in some countries, & them not very large: these winds oftentimes haue another maner of generation, & that is on this manner. It must nẽds be confessed, that within ỹ globe of ỹ earth, be wonderfull great holes, caues, or dungeons, in which when aire aboundeth (as it may by diuers causes) this aire that cannot abide to be pinned in, findeth a little hole, in or about those countries, as it were a mouth to breake out of, and by this meanes bloweth vehemently: yet that force & vehemency extendeth not farre, but as the wind that commeth forth of bellowes, nere the comming forth is strong, but far of, is not perceiued. So this particular wind, in that country where it breaketh forth, is very violent & strong, in so much, that it ouerthroweth both trees

Windes.

The second kinde of windes.

and houses, yet in other countries, not very farre distant, no part of that boysterous blast is felt. Wherfore this wind differeth from the generall winds both in qualities and substance or matter: for the matter of them is an Exhalation, and the qualities such as the nature of the Exhalation is very ayrie, but not ayre indeede: but of this particular winde, the matter and substance is most commonly ayre.

The third kind of winde.

There is yet a third kinde of winde, which is but a soft gentile and cole moving of the ayre, and commeth from no certaine place (as the generall wind doth) yea, it is felt in the shaddow vnder trees, when in the hote light and shining of the Sunne, it is not perceiued. It commeth whisking suddainely, very pleasant in the heate of the Summer, and ceaseth by and by. This properly is no wind, but a moving of the ayre by some occasion. As for the generall windes, they blow out of diuers quarters of the ayre now East, now West, now South, now North, or else enclining to one of the same quarters. Among which the East winde following the nature of the fire, is hote and drie, the South wind expressing the qualitie

lity of the ayre, is hote and moyſt, the Weſterne blaſt, agreeing with the waters propertie, is cold and moyſt. The North, that neuer was warmed with the heat of the Sunne, being cold and dry, partaketh the conditions of the earth. The middle windes haue middle and mixed qualities, after the naturs of thoſe foure principall windes more or leſſe, as they encline to ward them more or leſſe.

The qualities of the winds and the foure quarters of the world.

The qualitie of middle winde.

Generally the profit of all windes, by the wonderfull wiſdome of the Eternall God, is wonderfull great, vnto his creatures. For beſides that theſe windes alter the weather, ſome of them bringing raine, ſome drineſſe, ſome froſt and ſnow, which all are neceſſarie, there is yet an vniuerſall commoditie, that riſeth by the onely mouing of the ayre, which were it not continually ſtirred, as it is, would ſone putrifie, and being putryfied, would be a deadly infection to all that hath breath vpon the earth. Wherefore this winde whoſe ſound wee heare, and know not from whence it commeth, nor whither it goeth (for who can affirme from whence it was rayſed, or where it

The profit of wind.

Ionn. 3.

is laid downe: (as all other creatures beside doe teach vs the wonderfull & wise prouidence of God, that we may worthily cry out with the Psalmist, & say: O Lord, how manifold are thy workes, in wisedome hast thou made them all, &c. Let this bee sufficient to haue shewed the generation of the windes.

Psal. 104.

Of Earthquakes.

Earthquakes

An earthquake, is a shaking of ỹ earth, which is caused by meanes of winde & Exhalations, that bee enclosed within the caues of the earth, and can find no passage to breake forth, or else so narrow a way that it cannot come enough be deliuered. Wherefore, with great force and violence it breaketh out: and one while shaketh the earth, another while rendeth and cleaueth the same: sometime it casteth vp the earth, a great height into the ayre, and sometime it causeth the same to sinke a great deapth downe, swallowing both Cities and townes, yea and also mighty great mountaines, leauing in the place where they stood, nothing but great holes of an vnknowne depth, or else great lakes of waters.

Of

Of diuers kindes of Earthquakes.

Diuers kinds of earthquakes.

Diuers Authors write diuerſly, of the kinds of earthquaks, ſome making more and ſome leſſe, but we ſhall be content at this time to comprehend them in foure ſortes.

The firſt kind is when the earth is ſhaken laterally, to one ſide, which is, when the whole force of the winde, driueth to one place, and there is no other contrary motion to let it. This winde, if it be not great, ſhaketh the earth, that it trembleth as a man that hath a fit of an ague, and doth no more harme: but if it be great and violent, it looſeth the foundations of all buildings, be they neuer ſo ſtrong, and ouerthroweth whole cities, but eſpecially the great buildings, and not onely ſuch buildings, but ſometime alſo caſteth downe great hilles, that couer and ouerwhelme all the valley under them. Many noble and great Cities haue bene ouerthrowne by this kind of earthquake. It is written, that twelue of the moſt beatifull Cities, and moſt ſumptuous buildings in all Aſia, were ouerthrowne and vtterly

Twelue Cities ouerthrowne with one earthquake.

destroyed with an earthquake. How often Antiochia, yea, within short time was destroyed, they which haue read the Histories, can testifie. How terrible was the earthquake that shoke Constantinople a whole yeare together, that the Emperour, and all the people, weare faine to dwell abroad in the fields, vnder tents and pauilions, for feare their houses would fall on their heads, it is recorded in Chronicles, and worthy to be remembred.

Constantinople the chiefest citie of Greece, now the Turkes Pallace.

The second kind.

The second kind is, when the earth with great violence is lifted vp, so that the buildings are like to fall, and by and by sinketh downe againe: this is, when all the force of the windes striueth to get vpward, after the nature of Gunpowder, and finding some way to bee deliuered out of bondage, the earth that was hoysed up, returneth to his old place.

The third kind.

The third kinde is a gaping, rending, or cleauing of the earth, when the earth sinketh downe, and swalloweth vp cities, and townes, with castels, and towers, hilles and rockes, riuers, and flods, so that they be neuer seene againe.

Earthquake on the Sea.

Yea the Sea in some places hath beene drunke

ſunke vp, ſo that men might haue gone ouer on foote, vntill the time of tyde or flood returning couered the place with waters againe. But in the land, where this earthquake ſwalloweth vp any Citie, or Countrie, there appeareth nothing in the place thereof, but a marueilous wide and deepe gulfe, or hole. Ariſtotle maketh mention of diuers places, and regions that were ouerthrowne with this kinde of earthquake. Ariſtot.

The fourth kinde, is when great mountaines are caſt vp out of the earth, or els when ſome part of the land ſinketh downe, and in ſtead thereof ariſe riuers, lakes, or fires breaking out with ſmoake and aſhes. It cauſeth alſo overflowings of the Sea, when the Sea bottome is lifted up, and by this meanes ariſe many Ilands in the Sea, that neuer weꝛe ſéene beforꝛe. Theſe and other ſuch miracles, are often to bée found in the writers of Hiſtories, alſo in the Philoſophers, as Ariſtotle, Seneca, and Plinius. The fourth kind. New Ilands in the Sea. Ariſt. Seneca. Plinius.

Neuertheleſſe, the effectes of ſome as moſt notable, it ſhall not bee vnprofitable to receite. Plato in his Dialogue, intituled Timens, maketh mention by ỹ way Plato.

of

A wonderfull earthquake. Africa, Europa, Asia, the three parts of the earth.

of a wonderfull earthquake, whereby not onely Africa was rent a sunder from Europa and Asia (as it is indeed at this day, except a little necke by the red Sea) the Sea entring betwéne them that now is called Mare mediterraneum: but also a wonderfull great Iland, which hée affirmeth, was greater than Africa and Asia both, called Atlantis, was swallowed up, and couered by the waters, in so much, that on the Sea called Atlanticum, for a great while after, no shippe could sayle, by reason that the same huge Sea, by resolution of the earth of that mighty Iland, was all turned into mudde. The famous Ile of Sicilia was also sometime a part of Italy, and by earthquake rent a sunder from it. Seneca maketh mention of two Ilands, Theron and Therea, that in his time were appeared. It should séeme both by Aristotle, and also by Herodotus, that Egypt, in ancient time, was a gouiph of the Sea, and by earthquake made a dale land. During the reigne of Tiberius the Emperour, twelue notable Cities of Asia were ouerthrowne in one night, &c.

Mare mediterraneum becausse it goeth thorow the midst of the earth.

Atlantis. an Iland.

Seneca. Theron & Therea.

Aristo Herodotus. Egypt sometime a gulph of the Sea.

How

How ſo great windes come to be vnder the earth.

THe great caues and dennes of the earth, muſt needs be full of ayre continually: but when by the heate of the Sunne, the moyſture of the earth is reſolued, many Exhalations are generate as well within the earth, as without, and whereas the places were full before, ſo that they could receiue no more, except part of that which was in them, nor let out, in ſuch countries, where the earth hath few pores, or elſe where they be ſtopped with moiſture, it muſt needs follow, that theſe Exhalations ſtriuing to get out, muſt needs rend the earth in ſome place, or lift it vp, ſo that either they may haue free paſſage, or elſe rome enough to abide in.

Of the ſignes and tokens that go before an earthquake moſt commonly.

THe firſt is the raging of the Sea, when there are no tempeſtuous windes to ſtirre it, yea, when the ayre is moſt calme without windes. The cauſe why the Sea then rageth, is, that the winde beginneth to labour for paſſage, that

The ſignes of an earthquake.

that way, and finding none is sent backe, and some after shaketh the land.

The second signe is calmesse of the ayre, and cold, which commeth to passe, by reason that the Exhalation, that should be abroad, is within the earth.

The third signe is said to bee a long thinne streake of cloud seene, when the skie is cleare, after the setting of the Sun. This (say they) is caused, by reason that the Exhalation or vapour, which is the matter of cloudes, is gone into the earth. Other affirme, that it is the Exhalation that breaketh out of some narrow hole of the earth, out of which the rest of the wind cannot issue, neither will it waite the time: wherefore within a while after, it seeketh and maketh it selfe, by sudden eruption, a broader way to be deliuered out of prison.

Also the Sunne, certaine daies before it appeareth dimme, because the winde, that should haue purged and dissolued the grosse ayre, that causeth this dimnesse to our eyes, is enclosed within the bowels of the earth.

The water in the bottome of deepe welles is troubled, and the sauour thereof infec-

infected, because the pestilent Exhalations ẏ haue bæne long inclosed within ẏ earth, doe then beginne a little to be sent abroad. For thereof commeth it, that in many places where earthquakes haue bæne, great abundance of smoke, flame, and ashes, is cast out, when the abundance of brymstone that is vnder the ground, through violent motion is set on fire, and breaketh forth. Finally, who knoweth not, what stinking minerals and other poysonous stuffe doe grow vnder the earth? wherefore it is no wonder, if well water, before an earthquake be infected: but rather it is to be marueiled if after an earthquake, there follow not a grieuous pestilence, when the whole masse of infection is blowne abroad.

Last of all, there is heard before it, in the time of it, and after it, a great noise and sound vnder the earth, a terrible groaning, and a very thundering, yea, sometimes when there followeth no earthquake at all, when as the winde, without shaking of the earth, findeth a way to passe out att. And these for the most part, or at least some of them, are forewarnings, that the most fearefull earth-

Thundring vnder the earth.

earthquake will follow, than the which, there is no naturall thing, that bringeth men into a greater feare. Cato was very curious to confesse himselfe, that he repented, that euer he went by water, when he might haue gone by land. But what land can be sure, if it be the Lords will, to this worke of his to shake it? what building so strong, that can defend vs, when the more strong, the more danger, the higher, the greater fall.

Cato.

Of Thunder.

Thunder.

THunder is a sound caused in ỹ cloud by the breaking out of a hote and dri Exhalation, beating against the edges the cloud. It is often heard in spring an summer by reason that the heat of ỹ sunn thē draweth vp many Exhalations, whic meeting in the middle region of the ayr with cold & moist vapors, are together wi them inclosed in an hollow cloude: b whe the hot Exhalation cannot agrée wi the colonesse of the place, by this strife b ing driuen together made stronger a kindled, it will neuer breake out, whi sudden & violent eruption causeth ỹ no which we call thunder. A similitude is g by great authors, of moist wood ỹ crack

A similitude

in the fire: we may adde heereunto ẏ breaking of an egge in the fire, of an apple, or any like thing: for whatsoeuer holdeth & withholdeth enclosed any hote wind, so ẏ it can haue no vent, it will seeke it selfe away, by breaking the skin, shell or case. It were no ill comparison, to liken thunder to the sound of a gunne, which be both caused of the same or very like causes.

The sound of thunder is diuers, after which, men haue deuided the thunder into diuers kinds, making first 2. sorts, that is, small thunder & great. But as for ẏ diuersity of sounds generally it cometh of the diuers disposition of the clouds one while hauing more holes than at another, sometime thicker in one place, thā in another. The small or little thunder, is when ẏ Exhalation is driuē frō side to side of ẏ cloud, making a noyse, & either for ẏ small quantity, & lesse forciblenes, or else for ẏ thickes of ẏ clouds wals, is not able to breake them, but rumbleth vp & downe within the cloud, whose sides are stronger than ẏ force of the Exhalation is able to breake, it rumbleth vp & downe within, & striking against the cloud & moist sides maketh a noyse, not vnlike to the quenching of hote iron in cold water.

Diuerskinds of thunder.

Small thunder, and the kindes there of.

And

And if the Exhalation be meanly strong, and the cloud not in all places of like thickenesse, it breaketh out at those thin places with such a buzzing, as wind maketh blowing out of narrow holes.

But if the cloud bee so thinne, that it cannot keepe in the Exhalation, although it bee not kindled, then it bloweth out with like puffing, as wind commeth out of a payre of bellowes.

Great thunder and the kinds thereof.

A great thunder, is when the Exhalation is much in quantitie, and very hote and drie in qualitie, the clouds also very thicke and strong, that easily will not giue place to the wind, to escape out.

Wherefore if the Exhalation doe vehemently shake the cloud, though it doe not at the first disperse it, it maketh a long and fearefull rumbling against the sides of the cloud, vntill at the last being made stronger by swifter motion, it dissolueth the cloud, and hath libertie to passe out into the open ayre. The cloud dissolued, droppeth downe, and then followeth a showre of raigne.

Otherwhyles it shaketh the cloud, not long, but straightway rendeth it a

long

long ſpace and time, whoſe ſound is like the rending of a broad cloth, which noyſe continueth a prety while.

And ſometime it diſcuſſeth the cloud at once, making a vehement & terible crack like a gunne, ſometime with great force caſting out ſtones; but moſt commonly fire, which ſetteth many high places on fire. As in the yeare of our Lord, 1561. the fourth day of June, the ſteeple of ſaint Pauls church in London was ſet on fire, as it hath beene once or twiſe before, and burned.

The noyſe of thunder, though it be great in ſuch places ouer which it is made, yet is it not hard farre off, eſpecially againſt the winde. Whereof we had experience, alſo in the yeare of our Lord, 1561. on Saint Matthias day in February, at the euening, when there was a great flaſh of lightening, and a very terrible crack of thunder following, they that were but xv. miles from London Weſtward, heard no noyſe, nor ſound thereof: the winde that time was Weſterne. How farre thunder is heard.

The effect of thunder is profitable to men; both for that the ſweete ſhowre doth follow it, and alſo for that it purgeth The profit of thunder.

geth and purifieth the ayre, by the ſwift mouing of the Exhalation that breaketh forth, as alſo by the ſound, which deuiding and pearching the ayre, cauſeth it to be much thinner: which may be verified by an hyſtory that Plutarchus in the life of T. Quincius Flaminius reporteth, that there was ſuch a noyſe made by the Grecians, after their liberty was reſtored, that the birds of the ayre that flew ouer them were ſéene to fall downe, by reaſon that the ayre diuided by their cry, was made ſo thinne, that there was no firmity or ſtrength in it to beare them vp. And let this ſuffice for Thunder, whom lightning ſucceedeth in treatie, that ſeldome is from it in nature.

Plutarchus.
T. Quincius Flaminius.

Of Lightning.

Among the diuers kinds of lightning, which writers in this knowledge doe number, we ſhall entreat onely of foure kindes, yet ſo, that vnder theſe foure, all the reſt may bée comprehended. The names wée muſt borrow of the Latine tongue. The firſt is Fulgetrum, The ſecond Coruſcario, the third Fulgur, the fourth Flumen.

Lightning.
Fulgetrum.
Coruſcario.
Fulgur.
Flumen.

Of

Of Fulgetrum.

Fulgetrum

FUlgetrum wée call that kind of lightning, which is seene on summer nights and euenings, after a hote day. The generation hereof is such, when many thinne, light and hote Exhalations, by the immoderate heate, haue beene drawne vp from the earth, and by the absence of the sunne be destitute of ỹ force, whereby they should haue béene drawne further vpward, yet something ascending by their owne nature, in that they bee light and hote, they méete with the cold, either of the night, in the lowest region, or else of the ayre, in the middle region, and so by resistance of contraries (as it hath béene oft before rehearsed) they are beaten back, and with the vehement moning set on fire. This lightning commonly goeth out in ỹ ayre, terrible to behold, not hurtfull to any thing: Except somtime, when the matter of it is earthy and grosse, being striken downe to the earth, it blasteth corne, and grasse, with other small hurt. Sometimes it setteth a barne or thacked house on fire. The colour of this lightning, as of all other, is diuers,

The colour of this lightning.

partly according to the matter, & partly according to the light. If the matter bee thinne, it is white, if ỹ ſubſtance be groſſe, it is ruddie, like flames of fire: in great light, as in the day, it appeareth white, in the night, ruddy: yet ſometime in the day time, we may ſée it yellow, which is a token that the matter is wonderfull thicke & groſſe. Old wiues are wont to ſay, that no night in the yeare, except one, palleth without lightening: but that is as true, as the reſt of their tales, whereof they haue great ſtore.

Of Coruſcation

Coruſcation

Coruſcation is a gliſtering of fire rather than fire indéed, and a glimmering of lightning, rather than lightning it ſelfe: which is two maner of wayes; one way, when clouds that be lower than the vpper part of the earth, without the compaſſe of our ſight, are enflamed: and the reflexion of that flame is caſt vp into our ſight, appearing in all points like lightning, ſauing that the ayre, where it appeareth, is ſo cleare, that we are perſwaded, no lightning can be there cauſed. Another way, is when there be thicke cloudes ouer vs, & commonly a double order of cloudes, one about

aboue an other: if lightning or any other inflamation be in the upper part of these clouds, the light of them perceth thorow the lower parts, as thorow a glasse, and so appeareth, as though it lightned, when perhappes it did lighten indeed: yet that which wee saw, was but the shaddow thereof. And this is often without thunder.

Of Fulgur.

Fulgur. FVlgur is that kind of lightning which followeth thunder, whereof wee haue spoken before. For when that violent Exhalation breaketh forth, making a noyse as it beateth against the sides of the cloud, with the same violence it is set on fire, & casteth a great light, which is sœne, farre & nære. And although the lightning appears vnto us, a good pretty while before ỳ thunderclap be heard, yet it is not caused before the noyse, if any thunder at all doe follow, but either is after it or with it. Wherefore ỳ we see it, before wee heare the thunder, may be ascribed, either to the quicknes of our sight, that preuenteth the hearing, or else to the swift moving of

The lightning is not before the thunder, though it seeme so.

Sight preventeth hearing.

the fire and the light thereof, to our eyes, and the slow mouing of the sound, vnto our eares and hearing. These three kinds of lightnings are more fearefull than hurtfull, but the fourth seldome passeth without some dammage doeing.

Of the fourth kinde, called Fulmen.

The most dangerous, violent and hurtfull kind of lightning is called Fulmen, whose generation is such as followeth: What time a hote Exhalation is enclosed in a cloud & breaking the same, bursteth forth, it is set on fire, and with wonderfull great force stricken downe toward the earth. The crack of thunder that is made when this lightning breaketh out, is sudden, short, and great, like the sound of a Gunne. And oftentimes a great stone is blowne out with it, which they call the thunder-bolt which is made on this manner. In the Exhalation which is gathered out of the earth, is much earthly matter, & clottering together by moysture, being clammy by nature, consisting of brimstone, and other mettallike substance,

The thunder bolt cast out of the clouds

by

by the excessiue heate, is hardened as a brick is in the fire, and with the mighty force of the Exhalation strongly cast toward the earth, and striketh downe steeples, and high buildings of stone, and of wood, passeth thorow them, and setteth them on fire, it cleaueth trees and setteth them on fire: and the stronger the thing is that resisteth it, the more harme it doth to it. It is sharpe pointed at one end, and thicke at the other end, which is caused by reason that the moyster part, as heauier, goeth to the bottome of it, so is the top small, and the bottome thick.

Strongest things are most hurt of lightning.

When write, that the thunderbolt goeth neuer aboue fiue foote deepe, when it falleth vpon the earth: which standeth with reason, both because the strength of it is weakened, before it come so neere the ground, and also, because the continuall thicknesse of the earth breaketh the force, were it neuer so great.

How deep a thunderbolt goeth into the earth.

Both Aristotle, Seneca, and Plinius deuide this lightning into three kinds.

Aristotle. Seneca. Plinius.

Of the first.

THe first is drye, which burneth not, to be felt, but deuideth, and appeareth

Drie lightning.

with wonderfull ſwiftneſſe. For being ſubtill and pure, it paſſeth thorow the pores of any thing, be they neuer ſo ſmall and ſuch things, as giue place vnto it, it hurteth not, but ſuch things as reſiſt, it diuideth and pierceth. For it wil melt money in mens purſes, the purſes being whole and vnharmed. Yea, it will melt a ſword in the ſcabberd, and not hurt the ſcabberd at al. A wine veſſell it wil cleane and yet the wine ſhall be ſo dull, that by the ſpace of three dayes, it will not runne out. It will hurt a mans hand, & not his gloue. It will burne a mans bones within him to aſhes, and yet his ſkinne and fleſh ſhall appeare faire, as though nothing had come to him. Yea, otherwiſe the whole man in the moment of an houre ſhall be burned to aſhes, whereas his clothes ſhall not ſeeme to haue beene touched. It wil alſo kill the child in the mothers belly, and not hurt the mother: And all becauſe the matter is very ſubtill, & thinne, burning, and paſſing thorow what ſoeuer it bee, that will not giue it free paſſage.

Money molten in mens purſes, and ſwords in ſcabberds.

Of the ſecond kinde.

Moyſt lightning.

THe ſecond kinde is moyſt, and becauſe it is very thinne, it burneth not

to

to ashes, but onely blasteth or scorcheth trees, corne and grasse: and by reason of the moystnesse, it maketh all things black that it commeth nére, as moyst wood burning, is smoakie, & maketh things nére it to be black and smoakie.

Why it maketh blacke.

Of the third kinde.

The third king is most like our common fire that we haue here on the earth of grosse & earthly substance, wherefore it leaueth a print whereit hath béene, or else consumeth it into ashes, if it be such a body as will be burned with fire.

Grosse lightning.

Of the maruailes of lightning, and their causes.

Beside the wonderfull effects of lightning, that haue béene already remembred, there be many other which hereafter ensue, with the reason and causes unto them belonging, as thus:

The maruell of lightning.

The nature of lightning is, to poyson beasts, that are stricken therewith, as though they had béene bitten by a serpent. The cause of this is, that the matter of lightning is much infected with

Lightning poysoneth.

Brim-

Brimstone, and other poysonous mettal-like substances, which will poyson the rather in lightning, because it is thinne, and giueth them passage into euery part of the bodie.

Seneca. Wine not running, the vessels being broken.

It is notable, that Seneca writeth, how wine vessels of wood being burned with lightning, the wine would stand still, and not runne out: the reason hereof, is the swift alteration and change, whereby also all the clammineſſe of the wine is drawne to the outwardmoſt part, and so keepeth in the wine, as in a skinne, that by the space of three dayes it will not run. It will also poyson wine, insomuch that they which drinke thereof, shall either be madde, or dye of it: the cause hereof was set forth before.

Lightning purgeth a poysonous beast.

Lightning that striketh a poysonous beast, purgeth it from the poyson, in so much, that it causeth a Serpent or snake which is killed, to breede wormes, which otherwise it would not doe, but being purged from the naturall poyson, by the swift pearcing of the lightning, nothing letteth, but that it may breede wormes, as all other corrupt flesh will doe.

A snake breedeth no wormes.

If

If lightning ſtrike one that ſléepeth, it openeth his eyes, and of one that waketh, it ſhutteth the eyes. The cauſe is this, that it waketh him that ſléepeth, and killeth him, before hée can cloſe his eyes againe. And him that waketh, it ſo amazeth, þ hée winketh, as he will doe at any ſudden chaunce: ſo he dyeth, before he can open his eyes againe. Lightning openeth his eyes that ſleepeth, & cloſeth his that waketh.

All liuing things turne their face toward the ſtroke of the lightning, becauſe it is their nature, to turne their head if any thing come ſuddenly behind them. The reſt that haue their face toward it, when it commeth, neuer turne before they be killed. Liuing things turne their face toward lightning.

The reaſon why it killeth the child in the mothers wombe, not hurting the mother, is the tendernes of the one, and the ſtrength of the other, when the lightning is not vehement, otherwiſe both ſhould die together.

Sometime lightning burneth onely the garments, ſhoes, or hayre of men, not hurting their bodies, and then the Exhalation is nothing vehement. Sometime it killeth a man, & there appeareth no Garments burnt, the body vnhurt.

wound

wound without, neyther any hurt within, no not so much as any signe of burning: for then the Exhalation, which being kindled, is called lightning, is wonderfull subtill and thinne, so swiftly passing thorow, that it leaueth no marke or token behind it.

Lightning causeth blindnesse, swelling or Leprosie.

They that beholde the lightning, are either made blinde, or their face swelleth, or else become Lepers, for that fiery Exhalation, receyued into the pores of their face and eyes, maketh their face to swell, and breake out into a Leprosie, and also dyeth vp the Christalline humour of their eyes, so that consequently they must nedes be blinde.

Eutropius. Marcus Tullius Cicero.

Eutropius sheweth, that the same day, in which Marcus Tullius Cicero was borne, a certaine Virgine of Rome riding into Apulia, was stricken with lightning, so that all her garments being taken from her without any rending, shee lay starke naked, the lasing of her brest being vndone, and her hose garters vntyed, yea, her bracelets, collars, and rings being all losed from her. Likewise her horse lay dead, with his bridle and girtes vntyet.

Apulia.

The

The places of them that are burnt with lightning, are colder than the reſt of their bodies, eyther becauſe the greater heat draweth away the leſſer, or elſe, becauſe that by the great violence, the vitall heat is quite extinguiſhed in that place. The wounds of lightning cold.

The Sea-Calfe is neuer hurt with lightening: wherefore the Emperours Tents were wont to bee couered with their ſkinnes. Sea-Calfe not hurt with lightning.

The Bay trées, and Box trées, are neuer, or ſeldome ſtriken with lightning. The cauſe of theſe may be, the hardneſſe of their ſkinne, which hath ſo few pore holes, that the Exhalatiou cannot enter into them. Bayes and Box trees ſeldome hurt with lightning

The Eagle alſo among fowles, is not ſtriken with lightning. Wherefore the Poets fayne, that the Eagle carrieth Iupiters armour, which is lightning. The reaſon may be the thicknelſe and dryneſſe of her feathers, which will not be kindled with ſo ſwift a fire. The Eagle Iubiters harneſſe-bearer.

Of ſtorme windes.

A Storme wind, is a thicke Exhalation, violently moued out of a cloud, without inflāmation or burning: the matter Storme windes.

ter of this ſtorme is all one with the matter of lightning, that hath beene ſpoken of: namely, it is an Exhalation very hote and drie, and alſo groſſe and thicke, ſo that it will eaſily be ſet on fire: but then, it hath another name, and other effects.

The forme or maner of the generation is ſuch: When abundance of that kind of Exhalation is gathered together, within a cloud, which needes will haue one way out or other, it breaketh the cloud, and cauſeth thunder, as it hath beene taught before: but if the matter be very thicke, & the cloud ſomewhat thinne, then doth it not rend the cloud, but falling downe, beareth the cloud before it, & ſo is carried, as an arrow out of a bow. It doth alwayes goe before a great ſudden ſhowre; for when the cloud is broken the water muſt needs fall downe. Alſo it is ſo groſſe, & ſo thicke, that it darkneth the ayre, and maketh all the lowelt region of the ayre, to be in maner, as a darke ſmoakie cloud. It cauſeth tempeſt in the Sea, & wonderfull great danger to them that beare ſayle, whome if it ouertake, it bringeth to vtter deſtruction.

A ſudden is this kind, that it cannot be

reſiſted

resisted with sudden helpe.

So violent it is, that feeble force cannot withstand it.

Finall, it is so troublesome with thunder, lightning, rayne, and blast, besides these, darkenesse and cold, that it would make men, at so neere a pinch, to bee at their wits end, if they were not accustomed to such tumultuous tempest.

Wherefore it were profitable, to declare the signes that goe before it, to the end men might beware of it.

But they are so common to other tempests, that either they are knowne well enough, or else being never so well known, in a seldome calamity, they would little be feared.

The Sea ships subiect to more danger, haue more helpe, if it bee vsed in time: but no signes foreknowne, can profit the dweller of the land, to keepe his house from ruine, except it were to saue his life from the fall of his mansion.

The sudden violence of this tempest to him is more seldome times, but more incurable, when it commeth, then to the Marryner, who hath some ayde

to

to lok for, by his comming: the other, if he escape with his life, may comfort himself that he was nere a great danger, and cast with himselfe to build vp his house againe.

Of wirlewinds.

Whirlwinds

A Whirlewind, is a winde breaking out of a cloude, rowling or winding round about, ouerthrowing that which standeth nere it, and that which commeth before it, carrying it with him aloft in the ayre.

It differeth from a storme wind in three points.

First in the matter which is lesse in quantity, and of thinner substance.

Secondly, in the mouing, which is circular, winding about, whereas the storme bloweth aslope and sidelongs. Also a whirlewinde, in the mouing diuideth not it selfe abroade, and bloweth directly as the storme doth.

And thirdly, in the manner of the generation: for a storme doth alwayes come out of one cloud, but a whirlewind sometime is caused by meanes, of two contrary windes that mete together.

In like manner, as we se in the streats

of

of Cities, where the wind is beaten back from two walles, meeting in the middeſt of the ſtreat, there is made a little whirlewind, which whiſking round about, taketh up the duſt, or ſtrawes, and bloweth it about, after the very ſimilitude of the great and fearefull whirlewinde.

The reaſon of the going about, is this that when the walles beat back the wind from them, which aboundeth in that place, and thoſe windes, when they meete, by reaſon of equall force on both ſides, can neither driue one the other backe againe, nor yet paſſe thorow one the other, it muſt needes bee, that they muſt both ſeeke a way on the ſide at once, and conſequently, be carried round about, the one, as it were, purſuing the other, vntill there bee ſpace enough in the ayre, that they may be parted aſunder.

The matter of a whirlewind, is not much differing from the matter of ſtorme and lighting, that is, an Exhalation hote and drie, breaking out of a cloud, in diuers partes of it, which cauſeth the blowing about. Alſo it is cauſed, as it hath beene ſayd, by two, or more windes, blowing from diuers places,

which may be of particular causes, that haue bene shewed before in the chapter of windes. This tempest is noysome to man and beast, Sea and land, things liuing, & life lacking: For it will take vp both men and beasts, stones & clods of earth: which when it hath borne a great way, will not be so courteous, as to set them downe againe, but negligently letteth them fall frō a great height, or else violently throweth them downe to the earth.

The troubles of whirlwinds

It breaketh trees, winding them about, and pulling them vp by the rootes. It turneth about a ship, and drowseth it in pieces, with other mischiefes besides.

Of fired whyrlewinds.

Fired whirlwindes.

SOmetime a whirlewind is set on fire within ẏ cloud, & then breaking forth, flyeth round like a great cart-wheele, terrible to behold, burning & ouerthrowing all drie things ẏ it commeth neere, as houses, woods, corne, grasse, and whatsoeuer else standeth in the way.

It differeth not from a whirlewind, saiuing that it is kindled and set on fire, so appearing, else the generation of both is

called

called one.

Of Circles.

THe Circle called Halon is a garland of diuers colours that is ſéene about the ſunne, the Moone, or any other ſtarre, ſpecially about Iupiter or Venus, for their great brightneſſe. It is called of ỳ Grécks a compaſſed plat, of the Latines, a crowne or garland. Circles about the ſunne, the Moone & other ſtarres. Iupiter and Venus Planets.

The matter wherein it is made, is a cloud of equall thicknes, or thinneſſe, comming directly vnder the body of the ſunne the Moone, or other ſtarres, into which, the light of the heauenly body is receiued, and ſo appeareth round, becauſe the ſtarre is round: or as a ſtone caſt into the water, maketh many round circles, dilating in breadth, vntill the violence of the mouing is ended; ſo is it in the ayre, ỳ light beames piercing it, cauſe broad circles to bée dilated, which appeare white, purple, black, red, gréene, blew, and other colours, according to the diſpoſition of the clouds matter. The cauſe of ſuch colours, is ſhewed before, in the peculiar treatie of colours. Circles in the water. The colours of circles.

This circle is oftner ſéene about the Moone, than about the Sunne, becauſe

the heat of the Sunne draweth the vapors too high, where it cannot be made. Also, because the night is a more quiet time than the day, from winde, it is more often in the night, than in the day. Seldome, about other starres, because their light beames, are too weake, often to perce a cloud: yet oftner about small stars than the Sunne, because the light of the Sunne perceth the cloud more forcibly, than that this Halon can many times be cause.

Circles about a candle.

Otherwhiles it is séene about a candle, which must be in a very thicke and grosse ayre, of such proportionate thicknesse, that it may receiue the light as the cloud doth from the stars as in smoakie places, or hot howses.

This kinde of circle is sometimes like a rainebow, sauing that it is a whole circle, vnlesse the starre vnder which it is caused, bee not all risen, or else the cloud, in which it is séene, be not all come vnder the starre, or after it hath come vnder some part thereof, bee dissolued from the rest.

The signs of these circles

These Circles be signes of tempest and windes, as witnesse both Virgil, and

and Aratus.

The wind shall blow from that quarter, where the circle first beginneth to breake. The cause whereof is this, that the circle is broken by the winde that is aboue which is not yet come downe towards vs, but by this effect aboue, we may gather, both that it will come, and also from what quarter. Virgilius, Aratus, Poets.

A great Circle about the Mone, betokeneth great cold and frost to follow after. Signe of frost.

But if it vanish away and be dissolued altogether, it is a signe of fayre weather. Signe of faire weather.

If it be broken in many partes, it signifieth tempest. Signe of tempest.

If it ware altogether thicker and darker, it is a forewarning of rayne, Signe of rayne.

One alone, after Ptolomee, pure and white, vanishing away by little and little, is a token of faire weather. Ptolomeus. Signe of faire weather.

Two or three at once, portendeth tempest: if they be ruddy, they shew wind to come; and toward snow, they seeme as it were broken and rocky.

Being darke or dimme, they signifie all these foresayd euents, with more Signe of snow.

force and abundance: it is oftner caused in Autumne and Spring, than in Winter or Summer: the cause is the temperatenesse of the time.

The cause why it appeareth sometime greater, & sometime lesser, is in the quality of the matter, which as it is grosse or thinne, will more or lesse be dilated and stretched abroad, & also as some will haue it, of the weakenesse of mens sight. Of which, Aristotle bringeth an example in one Antipho, which did alwayes see his owne image before him in the ayre, as in a glasse: which he affirmeth to haue beene for the weakenesse of his sight beames, that could not pierce the ayre, so that they were reflected againe to himselfe.

Aristotle. Antipho.

And thus much for Halon, and the causes, signes, or tokens of it.

Of the Rainebow.

Raynebow.

The Raynebow, is the apparition of certaine colours in a cloud, opposite against the sunne, in fashion of halfe a Circle. Possidonius said, it was the sunnes looking glasse, wherein his image was represented, and that the blue colour, was the

Possidonius.

the proper colour of the cloud ; the red, of the ſunne ; all the other colours of commixtion.

It differeth manifoldly from Halon : for the Rayne bow is alwayes oppoſite againſt the ſunne : but Halon is directly vnder it.

They differ not onely in place, but alſo in faſhion : the Raynebow is but halfe a Circle : the Halon is a whole Circle.

Likewiſe they vary in colour : for the Raynebow is more dimme, and of purple colour : the Halon, whiter and brighter.

Alſo, in continuance , for the Raynebow may continue longer than Halon.

The image of the Raynebow may be ſæne on a wall, the ſunne ſtriking thorow a ſix-poynted ſtone, called Iris, or any other Chriſtall of the ſame faſhion ; alſo thorow ſome glaſſe windowe. A precious ſtone called Iris.

Halon is ſæne about candles, in ſmoky places, as are baths and kitchins.

The maner of the generation of the Raynebow is ſuch : There is oppoſite againſt the Sunne, a thicke watery cloud, which is already reſolued into

A similitude

dewy drops of rayne, as (for a grosse similitude) is seene on the potlidde, when the water in the vessell hath sodden, or is very hote, the lidde will bee all full of small drops of water, which come from the water in the vessell, first, by heate resolued into smoake, after, when it cannot goe at large, it is resolued againe. Wherefore vpon such a cloud, the Sunne beames striking, as upon a smooth glasse, doe expresse the image of the Sunne vnperfectly, for the great distance. Or else the Sunne beames striking into a hollow cloud, where they are refracted or broken, and so come to the eyes of him that beholdeth the raynbow.

The similitude of the raynbow.

The similitude thereof is seene, when men sayle or row in boates, the Sunne shineth upon the water, which casteth on the vessels side, the colours and image of the raynbow.

Likewise, water in an vrinall holden against the sunne, receiueth the light, and sheweth colours on the wall.

Rainbow of the Sunne, Rainbow of the Moone.

There be two kinds of raynebowes, one of the Sunne, another of the Moone, the one by day, the other by night: the raynebow of the Sunne often, but of the

Moone

Mone very seldome, in so much that it can be but twise in fifty yeeres, and that when the Mone is in the East or West, full in perfect opposition.

It hath not beene many times seene since the writing of Histories, yet sometimes, and for the rarenesse, is taken for a great wonder. Yet is it in colour nothing so beautifull as the Sunnes, but for the most part white as milke: other diuersities of colours are scant perceyued. When it appeareth, it is sayd to signifie tempest.

The time of the raynbow is often after the poynt of Autumne, both for the placing of the Sun in competent lownesse, and also for abundance of matter, seldome or neuer is the raynbow seene about the midst of Summer.

There may be many raynbows at one time, yet commonly but one principall, of which the rest are but shaddowes & images, the second, shaddow of the first, the third, of the second, as appeare by placing of their colours.

It remayneth, to shew why it is but halfe a circle, or lesse, & neuer more, and why the whole cloud receyueth not the

same

ſame colours that the rayneboẅ hath. The cauſe of the firſt is, becauſe the center oꝛ middle poynt of the raynboẅ, that is Diametrally oppoſite to the center of the ſame, is alwayes either in the Horizon (that is, the circle cutting off our ſight of heauen by the earth) oꝛ vnder it. The cauſe why the whole cloud is not coloured, is, becauſe that in the middeſt, the beames as ſtrong, pearce thoꝛoẅ, but on the edges where they are weaker, they are reflected oꝛ refracted.

Noẅ foꝛ ſo much as God made the raynboẅ a ſigne and Sacrament of his pꝛomiſe, ſome think it was neuer ſeene befoꝛe the flood: their reaſon may be this: that the earth, after the firſt creation, was then ſo fruitfull, that it nẽded none, oꝛ very little rayne, ſo that ſuch darke clouds were not often gathered, ẏ fruitful ground not ſo eaſily remitting his moyſture, that then was fat and clammy, hard to bẽ dꝛawn vp: ſo it might be, that there was no raynebolẅ beforꝛe, as we cannot finde that euer it rayned beforꝛe. But whether it were oꝛ not, it is certaine, that then it became a Sacrament, whereas it was none beforꝛe: which when we behold, it behoueth

vs

vs to remember the truth of God in all his promises, to his glory & our comfort.

The milke way, called of some, the way to Saint Iames, and Watling street.

The milke way is a white circle seene in a cleere night, as it were in the firmament, passing by the signes of Sagittarius and Gemini. The white circle seene in the night.

The cause thereof is not agreed vpon among Philosophers, whose opinions I thought best to report, before I come to the most probable causes.

First of all, Pithagoras is charged with a Poeticall fable, as though it had beene caused, by reason that the Sunne did once run out of his pathway, and burned this part whereof it loketh white. Pithagoras.

Other, as Anaxagoras and Democritus, sayd, that it was the light of certaine starres, shining by themselues, of their owne light, which in the absence of the Sun might be seene. But this opinion is also false, for the starres haue no light of themselues, but of the Sun: also if it were so, it should appeare about other starres. Anaxagoras. Democritus.

Democritus

Democritus is also reported to haue sayd, ỳ it was nothing else but innumerable little starres, which with their confuse light, caused that whitnesse: to this opinion, Cardane seemeth to subscribe.

Cardanus.

The Poets haue foure fables of it: one that Phaeton, which on a time guided the Chariot of the Sunne, and wandring out of the way, did burne that place, wherefore of Iupiter hee was stricken downe with lightning.

Phaeton.

The second, that it is the high street in heauen that goeth streight to Iupiters palace, and both sides of it the common sort of gods doe dwell.

Ouid. Meta. pr.

The third, that Hebe, one which was Iupiters Cupbearer, on a time stumbled at a starre, and shed the wine or milke that was in the cup, which coloured that part of heauen to this day: wherefore she was put out of her office.

Hebe.

The fourth that Apollo stood there to fight against the Giants, which Iupiter made to appeare, for a perpetuall memory.

Apollo.

Theophrastus, a Philosopher, affirmed, that it was the ioyning together, or seame of the 2. half Globes, which made it

Theophrastus.

appeare

appeare more light in that place than in other.

Other sayd, it was the reflexion of the shining light of fire or starre light, as it is seene in a glasse, but then it should be moueable.

Diodorus affirmed, that it was heauenly fire, condensed or made thick, into a circle, and so became visible, whereas the rest, for the pureneſſe, clearneſſe, and thinneſſe could not be seene. Diodorus.

Possidonius, whose mind to many seemeth very reasonable, said, it is the infusion of the heate of starres, which therefore is in a circle, contrary to the Zodiake, (out of which the Sunne neuer wandreth) because it might temper the whole compasse with vitall and liuely heat. Although in my mind he hath rather expressed the finall cause, than the efficient. Possidonius. Zodiake.

Aristotles opinion is, that it should be the beames of a great circle, which is caused by a cloud or Exhalation drawne vp by those starres, which be called Sporades. This opinion of Aristotles is misliked of most men that haue trauayled in this science, and worthily: For if it were Aristotle. Sporades.

were of the nature of elements, as Exhalations are, it would be at length consumed. But this circle neuer corrupteth, therefore it is not of Exhalations. Also it neither increaseth nor diminisheth, which is a plaine proofe, that it consisteth not of elementall matter, although Aristotle seeme to make a double circle, one celestiall, another elementall.

The last opinion is, of them that say it is of the nature of heauen, thicker in substance, than other parts of heauen be, hauing some likenesse to the substance of the Moone, which being lightned by the same, as all the starres be, appeareth white. And this opinion I take to be most probable, because that sentence of star-light seemeth not so reasonable, to be only in that place, and not elsewhere.

The finall cause of this milke-white circle, hath beene already touched in the opinion of Possidonius, whereunto also Plinius in the xviii. booke, & xxix. chapter of his naturall history, agreeth, affirming, that it is very profitable for the generatio and fruitfull increase of things that grow on the earth. The Mathematitians that haue measured ỹ breadth thereof, affirme, that

Possidonius. Plinius.

The breadth of this circle

that toward the North, it passeth ouer the ecliptical line of the ninth sphear, frō ỹ xviii. degrée of Gemini, vnto the ii. degrée of Cancer, which is xiii. degrees & toward the South, from the viii. degrée of Sagittarius, to the xiii. degrée of the same signe: and because it is there divided into ii. brāches (as may easily be seene in a cleare night) it reacheth from the xxiiii. of Sagittarius, to the ii. degrée of Capricorne.

This circle, if it be of the nature of heauen, is vnproperly placed among Meteors or impressions: but because of Aristotles mind, who will haue it to be an impression kindled, & their opiniō, which think it proceedeth of ỹ light of starres, it is not without good cause in this place intreated of.

Of beames, or streames of light, appearing thorow a cloud.

Beames or streames.

THere is yet another kind of impression caused by the beames of the Sunne, striken through a watery cloud, being of vnequall thinnesse, and is thinner in one part than in another, so that it cannot receyue the beames in any other forme, than that they appeare direct or slope downeward of diuers colours, and the same that are the colours of the Rayne-

bow,

bow, though not so euident, because the reflection is not so strong. They vary in colours: some are more purple or ruddy, when the cloud is thicker; some yellow or whitish, when the cloud is thinner, and so other colours are caused likewise, whereof you may read the proper cause in the colours of cloudes and other like parts of this Treatise.

The common people call it the descending of the holy Ghost, or our Ladies Assumption, because these things are painted after such a sort. Other say that it is raine, striking down in another place, as though they could see the drops falling. And they are not altogether deceyued, but in ỹ time: for some after, it will rayne, because this impression appeareth out of a watery cloud. They are called by diuers names, as rods, wands, cords of Tents, unto which they are not much vnlike, staues and little pillers, when they seeme greater and thicker, many being ioyned together.

The raynbow, the circles, and these light beames, are all of one maner of generation, in so much that if you diuide the circle, it shall be a raynbow, if you draw it streigh in length, it maketh streames or

beames.

beames. Herein they agree, namely, in forme and matter, but they differ in outward forme, which we may call fashion as the one is round, the other halfe round, and the third direct, straight or falling a-slope. Also, they differ in place, about which they stand: for streames are only about the Sunne; Raynebowes about the Sunne often, & seldome about the Moone but circles both about the Sunne and the Moone, and also about any other of all the Starres, yet rather & oftner about bright Starres.

To make an end of these streames, they appeare diuersly, after the fashion & place wherein the cloud hangeth, in respect of the Sunne: for sometime they are seene onely in the edge of a cloud, all the breadth of that cloud: sometime through the mids of a cloud, being thinner there than in other parts, and then they are spred round about, like a tent or pauilion vsed in war. They are most commonly seene in such times, as there is great abundance of raine, which they, by their apparition, doe signifie not yet to be ended.

And thus much concerning direct light beames called roddes, &c.

Of many Sunnes.

Many Sunnes at once. Alexander the great. Darius.

IT is ſtrange and marueilous to behold the likelyhood of that, which Alexander the great, ſending word to Darius, ſaid to be impoſſible, that two ſunnes ſhould rule the world. But oftentimes, men haue ſeene, as they thought in the firmament, not onely two Sunnes, but oftner three Sunnes, & many more in number, though not ſo often appearing. Theſe, how wonderfull ſoeuer they appeare, proceede of a naturall cauſe, which we will endeuour to expreſſe. They are nothing elſe but Idols or Images of the ſunne, repreſented in an equall, ſmoth, and watry cloud, placed on the ſide of the ſunne, and ſometime on both ſides, into which ỹ ſunne beames being receiued, as in a glaſſe expreſſe the likeneſſe of faſhion and light that is in the Sunne, appearing as though there were many ſunnes, whereas indeed there is but one, and all the reſt are images.

This thick and watry cloud, is not ſaid to bee vnder the ſunne, for then it would make the circles, called crownes or garlands: it is not oppoſite to the Sunne, for then would it make the rainbow: but it is

ſayd

layd to bée on the ſide, where the image may be beſt repreſented. Alſo it may not be to farre off, for then the beames will be to feéble to bée reflected: neither yet to néere; for if it ſo be, the ſune will diſperſe it: but in a competent & middle diſtance: for ſo repreſentation of many ſunnes is cauſed.

They are moſt often ſéene in the morning & euening, about the riſing or going downe of the Sun, ſeldome at none time, or about the midſt of the day, becauſe the heat will ſone diſſolue thē: yet hath there bene ſome ſéene, which began in the morning, & continued all the day long, vnto ỹ euening. Sometimes there appeare many little ſunnes, like vnto little ſtarres, which are cauſed after the ſame ſort, as we do ſée a mans face to be expreſſed in all the pieces of a broken glaſſe. So when the cloud hath many ſeparatiõs, there appeare many ſunnes, on one ſide of ỹ true Sun, ſometimes great, & ſometimes little, as ỹ parts of the cloud ſeparated, are in quantity.

Many ſmall ſunnes, like ſtarres.

Similitude.

They doe naturally betoken tempeſt and rayne to follow, becauſe they cannot apeare, but in a watry diſpoſition of the ayre.

The ſignification of many ſunnes.

Also, if they appeare on the Southside of the Sunne, they signifie a greater tempest, than if they appeare on the Northside. The reason is alleadged, because the Southerne vapour is soner resolued into water, than is the Northerne.

For a supernaturall signification, they haue oftentimes bene noted, to haue portended the contētion of Princes for kingdomes: As not long before the contention of Galba, Otho, and Vitellius, for the Empire of Rome, there appeared three Sunnes. Also of late, toward the slaughter of Lewis King of Hungarie, were seene three Sunnes, betokening three Princes that contēded for the kingdome, namely, Ferdinando since Emperour, Iohn Vayvode, and the great Turke.

Galba, Otho, and Vitellius

Of many Moones,

AFter the treaty of many Sunnes, it were not hard for any man, without farther instruction, to know the naturall cause of many Moones: For they are likewise Images of the Moone, represented in an equall cloud, which is watry, smooth, and polished, euen like a glasse. Some call them (as Plinius sayth) night sunnes, because they, ioyned with the light of

Many Moones.

Plinius.

of the true Moone, giue a great shining light, to driue away the shaddowe & darknesse of the night.

It were superfluous, to write more of their causes, or effects, which are all one with those, that haue bene declared of the Sunnes.

It may bee doubted, why the other starres doe not likewise expresse their image, in watry clouds, and so the number of them, to our sight, should be multiplied. It may be answered, that their light or beames are too feeble and weake, to expresse any such similitude or likenesse in the watry clouds: For although they haue garlands, or circles about them that are caused in a vapor, that is vnder them, yet it is manifest, that this apparition hath not need of so strong a light, as is required to print the images of them in the clouds. Againe, the garlands are direct vnder, and therefore apter to receiue such apparition. Why other starres are not so represented.

It may bee againe obiected, that the starres haue their image perfitly and sufficiently expressed in glasses here on the earth, yea, and at the day time, when their light is eyther none, or most feeble, and Objection.

weake, as we ſée it is uſed at Midſummer, to behold that great ſtarre called Sirius in a glaſſe euen at noone dayes.

Sirius a great ſtarre ſeene at noone in Summer.

Alſo we ſée euery night the image of the ſtarres in calme and quiet ſtanding waters: then what ſhould let, but that their images might alſo bée expreſſed in watry cloudes?

An anſwer.

Hereto may be anſwered, that ẏ let is in the cloud, which is neither ſo hard as is the glaſſe, nor yet ſo continuall as the water, but conſiſteth of innumerable ſmall drops, ſo that except the light of ẏ ſtarres were ſtronger, it can in them expreſſe no vniforme images of them, as it doth in glaſſes, and in the water. Notwithſtanding, in writers of wonders, wee read ſome ſuch like thing ſometime to haue chanced.

There hath bæne often ſæne many Sunnes in the day time, & after the ſunne ſetting: at the riſing of the full Moone, there haue appeared many Moones, which was by this meanes, that the ſame cloud, that receiued the Sunne beames in the morning, tarried in the ſame place, and at the Moones riſing, was ready alſo to receiue her image.

Of

Of wonderfull apparitions.

Wonderfull apparitions.

WE will close this book, with a brief declaration of the naturall causes of many things that are seene in the ayre, very wonderfull and strange to behold, which in these latter yeeres haue bin often seene and beheld, to the great admiration of all men, not without the singular prouidence of God, to forewarne vs of many dangers that hang ouer vs, in these most perilous times.

The apparition of which, as it is most wonderfull, so the searching of the cause, to vs is most hard and difficult, a great deale the rather, because no man hath hitherto enterprised (to my knowledge) to seeke out any cause of them, but all men haue taken them as immediate miracles, without any naturall meane or cause to procure them.

And I truely doe acknowledge, that they are sent of God, as wonderfull signes, to declare his power, & moue vs to amendment of life, in deede miraculous, but not yet so, that they want a naturall cause: for if they be well weighed & considered, it is not hard to find, that they differ much from such miracles as are recorded in the scripture,

ture, and admitted of diuines. So that as I abhorre the opinion of Epicures, to thinke that such things come by chance, but rather by the determined purpose of Gods prouidence: so I consent not with them, that suppose, when any thing is deriued from any naturall cause, God the chiefe and best cause of all things is excluded.

Some of these wonderfull apparitions consist of circles and raynbowes, of diuers fashions and placings, as one within another, the edge of one touching another, one deuiding or going thorow another, with like placing of small circles about great circles, or parts of small circles: some with the ends vpward, some downward, some aside, and some acrosse, but all for the most part in vniforme order constituted or placed for the order of them. pleasant to behold, but for the strangenesse, somewhat fearefull. Such a like apparition is made with the Sunnes or Mones images, ioyned vnto these circles, set also in good and vniforme order.

The cause of these is the meeting together of all those seuerall causes that make the circles, rainbowes, streames, & ima-

ges

ges of the Sunne or Moone, which ioyned all together, make the wonderfull sight of strange raynbowes, positians of circles, crosses, and diuers lights, which pertaine to the knowledge of Optice and Catroptice, that teach how by diuers refractions & reflections of beames, such visions are caused. So that he which will know how they are generated, must returne into the seuerall treatises of raynbowes, circles, streames, & images of the Sun or Moone: and if in them he find not knowledge sufficient to instruct him, I must send him to the demonstrations of perspectiue, where he shall want nothing. Optice. Catroptice.

Another sort of them, no lesse often beheld within these few yeares, than the former, but a great deale more strange and wonderfull to looke vpon, are the sightes of armies fighting in the ayre, of Castels, Cities, and Townes, with whole countries, hauing in them hills, vallies, riuers, woods, also beasts, men, and fowles, monsters, of which there are no such kindes on the earth, and finally, all manner of things and actions that are on the earth, as burials, processions, iudgements, combates, men, women, children,

children, horses, crownes, armes of certaine noble men, and countries, weapons of all sortes, sometimes starres, angels as they are painted with ỹ image of Christ crucified, besieging of castles and townes, many things and gestures done by men or beasts, the very similitude of persons knowne to the beholders as of late, was seene the very Image of the Emperour Charles, in so much that they which beheld it, put off their cappes, thinking verily it had béene he, and of Iohn Fredericke, Prince Elector of Saronie, who that time was prisoner with the Emperour. Also the image of small crosses, which hath béene not only in the ayre, but also on the earth, on mens apparell, on dishes, platters, pots, and all other things, so that the Iewes haue béene full angry, that they could neither wash, nor rub them out of their apparell. In Germany also fires and many such things, as it were long stories séene in the ayre.

All these wonderfull apparitions may be caused two manner of wayes: the one artificially, the other naturally. Artificially, by certaine glasses, and instrumẽts made according to a secret part of that know-

knowledge, which is called Catoptrice, and so peraduenture some of them haue bene caused, but the most part (doubtlesse) naturally, whē the disposition of the ayre hath bene such, that it hath receyued the image of many things placed and done on the earth. And because it is apt to receyue diuers images, as well in one place as in another, these monstrous formes and strange actions, or stories, proceed of the ioyning of diuers formes & actions, as if two historyes were confusedly paynted in one, the whole picture would bee strange: or (as the Poet saith) if a Paynter, to a mans head, should set a horses necke, and after, diuers feathers. Sometimes also, one image is multiplied in the ayre, into many or infinite, as are letters and crosses, which fill all ŷ ayre, euen beneath: And the light of ŷ Sunne, receyued into little parts maketh to appeare, as it were many small starres. Catoptrice. Horatius.

Let this suffice, concerning these wonderfull apparitions: once againe admonishing the Reader, though I haue enterprised to declare these by naturall reason, yet verily beleeuing, that not so much as one Sparrow falleth to the

ground,

ground, without Gods prouidence, I doe also acknowledge Gods prouidence bringeth these to passe, to such end as before I haue shewed, vsing these causes, as meanes and instruments to doe them.

The fourth Booke, of

Watry impressions.

THose be watry impressions, that consist most of water. In the treaty of them, are wont to bee handled these impressions, namely cloudes, rayne, dew, hoare frost, hayle, snow, springs, riuers, and the great sea it selfe.

Of Cloudes,

Cloudes,

A Cloud is a vapor cold and moyst, drawne out of the earth, or waters, by the heate of the Sunne, into the middle region of the ayre, where, by cold it is so knit together ỹ it hangeth, vntill either the waight, or some resolution, cause it to fall downe.

The place wherein the cloudes doe hang, is sayd to be in the middle region of the ayre, because men see it is necessari, that there should bee a cold, which should

should make those vapours so grosse and thicke, which for the most part are drawn so thinne from the earth, that they are invisible, as the ayre is. And although they are knowne oftentimes, as Aristotle witnesseth, to bee in the lowest region of the ayre, neere to the earth, in so much that sometimes they fall downe to the earth with great noyse, to the great feare of men, and no lesse losse and danger. Yet may it bee reasonably thought, that these clouds were generated in the middle region of the aire, farre distant from the earth, which by their heauinesse doe by little and little sinke downe lower into the lowest region, and sometimes also fall downe to the earth. Aristotle.

The common opinion is, that they goe not higher than nine myle, which, because it leaneth to no reason, is vncertayne. The height of the clouds.

Albertus Magnus, whose reason also is to be doubted of, affirmeth, that the clouds doe scarce exceed three miles in height, when they are highest. Albertus Magnus.

And some let not to say, that oftentimes they ascend not past the halfe of one myle in height.

Againe,

Againe, other pretending to finde out the truth, by Geometricall demonstrations, make it aboue fifty mile to ỹ place where the generation of clouds is.

How these men take the distance from the earth, it is uncertaine: whether that they assigne the least distance, & meane it from the highest part of the earth, as are hill tops, or from the common playne.

Againe, whether they that assigne the highest distance to be from the lowest valleys of the earth, or from the hill tops.

The reason before shewed, moueth me to thinke that the most vsuall & common generation, I meane, the condensation or making thicke of these thinne vapours, into clouds, is in the middle region of the ayre. But for the distance of the clouds, when they be generated, I thinke, they be sometims nine mile, sometime three mile, sometime halfe a mile, and sometime lesse than a quarter of a mile from the earth.

Mists.

Of Mists

THere be two kindes of mists: the one ascending, the other descending.

That which ascendeth, goeth vp out of the water, or the earth, as smoke, but doth not

not commonly, spread ouer al other parts: it is seene in riuers and moyst places.

The other mist ỳ goeth downe toward the earth, is when any vapor is lifted vp into the ayre, by the heat of the sun, which not being strong enough to draw it so high, ỳ the cold may knit it, suffereth it, after it is a little made thick, to fal downe againe; so it filleth all the ayre with the grosse vapours, and is called, Mists, being vsually a signe of faire weather.

Of empty cloudes.

Empty clouds.

THere be certaine clouds that are empty, and send no rayne; they come of two sorts. One sort are the remnants of a cloud that hath rained, which cannot be conuerted into water, for their drynesse.

Another sort is of them ỳ are drawne vp out of wet and dry places, and be rather Exhalations than vapours: that is, they be dry, hote, and light, so that it were hard for them to be turned into rayne: they lok white, like flocks of wooll, when the light striketh into them.

There be also empty clouds, which, when the windes haue dispersed abroad any cloud, are scattered ouer al ỳ skie: but these clouds, though for a time they be empty, yet

because

because they consist of such a substance as is watry, they may be, and are oftentimes gathered together, and giue plentifull rayne.

Of the colours of clouds.

Of the colours of cloudes, wee haue spoken in the second booke of fiery Meteors, where those colours and the causes of them are described, which seeme to bee fiery, or may be thought to be inflamations or burnings, as bee redde, fiery and yellowish.

But beside those, there be white, black, blue, and greene.

White clouds be thinne, and not very watry, so that the light receiued in them, maketh them to appeare white.

Blacke clouds be full of thicke, grosse, and earthly matter, that maketh them looke so darke.

Blue clouds bee full of thicke drosse, and earthly, as the blacke: so the light receiued in them, maketh them to seeme blue.

Greene clouds are altogether watry resolued into water, which receiuing into them the light, appeare greene, as water doth in a great vessell, or in the Sea and Riuers.

Of

Of Rayne.

AFter the generation of clouds is well knowne, it shall not be hard to learne, from whence the Raine commeth. Raine.

For after the matter of the cloud being drawne vp, and by cold made thicke (as is said before) heate following, which is most commonly of the Southerne winde, or any other wind of hot temper, doeth resolue it againe into water, and so it falleth in drops, to giue increase of fruit to the earth, and moue men to giue thankes to God.

There bee small showres, of small drops, & there be great stormes, of great drops.

The showres with small drops, procéede eyther of the small heate that resolueth the clouds, or else of ỹ great distance of the clouds from the earth.

The streames with great drops, contrariwise doe come of great heate, resoluing or melting the cloud, or else of small distance from the earth. Whereof wee see a plaine experiment, when water is powred forth from an high place, the droppes are small, but if it be not from height, it will either haue no droppes, or

very great.

The cause why raine falleth in round drops, is both for that the parts desire the same forme that the whole hath, which is round: and also, that so it is best preserued against all contrary qualities: like as we see water powred vpō dry or greasy things to gather it selfe into roundels, to auoid the contrariety of heate and dryneſſe.

Why raine water is not salt.

It is not to be omitted, that raine water, although a great part of it be drawne out of the sea, yet most commonly it is sweet and not salt.

The cause is, because it is drawne vp in such small vapours, and that salt part is consumed by the heat of the Sunne.

The raine water doubtlesse doth more encrease and cherish things growing on the earth, than any other water wherwith they may be watered, because the raine water retaineth much of the sunnes heat in it, that is no small comfort to all growing plants. The water that commeth from heauen, in raine, will sooner come to putrefaction, or stinking, than any other, because it hath beene made very subtill by heat, and also for that it is mixed with so many earthly and corruptible substances.

Rayne

Rayne water, that falleth in the ſummer, by Auicens iudgement, is more wholeſome than other water, becauſe it is not ſo cold and moyſt as other waters be, but hotter and lighter. Auicens.

Sometime there is ſalt rayne, when ſome Exhalation which is hot and dry, is commixed with the vapour whereof the rayne conſiſteth. Salt rayne.

Sometime it is bitter, when ſome burnt earthly moyſture is mixed with it. Bitter rayne.

This rayne is both vnwholeſome, and alſo vnfruitfull. In theſe countreys, there is great ſtore and plenty of rayne, becauſe the Sunne is of ſuch temperate heat, that it gathereth many vapours, and by immoderate heate doeth not conſume them. But in the Eaſt parts, in ſome hot countreys, it neuer or ſeldome is ſeene to raine, as in Egypt and Syria, but in ſtead of rayne, Egypt hath the River Nilus, whoſe ouerflowings doe marueylouſly fatten the earth. In Syria and other like countreys, they haue more plentifull dew, than we haue, which doeth likewiſe make their earth exceeding fruitfull. The riuer Nilus.

Seneca teſtifieth, that ỹ rayne ſinketh no deeper into the earth, than ten foote deepe. Seneca.

Of the signes of rayne.

Signes of raine.

FIrst, if the skie be red in the morning, it is a token of rayne, because those vapors which cause the rednesse, will be shortly resolued into rayne.

If a darke cloud be at the sunne rising, in which the sunne soone after is hidd, it will dissolue it, and rayne will follow. If then appeare a cloud, and after, vapours are seene to ascend vp to it, that betokeneth rayne.

If the Sunne or Moone looke pale, looke for rayne.

If the Sunne in the East seeme greater than commonly hee appeareth it is a signe of many vapours which will bring rayne.

If the Sunne bee seene very earely, or fewe starres appeare in the night, it betokeneth rayne.

The often changing of the winds, also sheweth tempest.

The most sure and certayne signe of raine is the Southerne wind, which with his warmenesse, alwayes resolueth the clouds into rayne.

When there is no dew at such times, as by nature of the time there should be,

raine

rayne followeth: for the matter of the dew is turned into the matter of watry clouds.

If in the West, about the Sunne setting, there appeare a blacke cloud. it will rayne that night, because that cloud shall want heate, to disperse it.

When much dust is rayſed up, & when the woods make a great noyse, some tempest is towards.

Hard stones will be moyst, and sweate against rayne: lamps & candles by sparkling, frogs crying, trées breaking, leaues falling, and dust clottering, forewarne us of a tempest.

Fleas, flyes & gnats, bite sore towards a tempest, kine fæde grædily, birds seeke their vitailes more busily: for in ỹ grosse ayre disposed to rayne, their stomacks are hotter, and they more hungry. But these kind of signes pertayns not so properly to Meteorologie, as to Mariners and husbandry, which haue a great many more than these. And Virgill in his first booke of Georgikes, hath a great number, for them that list to learne. Wherefore let these hitherto suffice.

Of monstrous or prodigious rayne.

Of monstrous rayne.

HItherto we haue made mention onely of naturall rayne, & that which is common which no man doth maruail at. But there is some time such rayne, that worthily may be wondred at: as when it rayneth wormes, frogges, fishes, blood, milke, flesh, stones, wheat, iron, wool, bricke, and quicksilver. For histories make mention, that at diuers times, it hath rayned such thinks whose naturall cause, for the most part, we will goe about to expresse, notwithstanding, accounting them among such wonders, as God sendeth to be considered for such ends, as we haue before declared. Wormes and frogges may thus be generated: when fat Exhalations are drawn vp into the ayre, by a temperature of heate and moysture, such vermine may be generated in the ayre, as they are on the earth, without copulation of male and female. Or else, that with ỹ Exhalations & vapors, their seede and egges are drawne vp, which being in the clouds brought to forme, fall downe among the rayne.

Wormes and frogges.

Likewise the spawne of fishes, being drawne vp, maketh fishes to rayne out of the clouds. The vehement heate of the Sunne,

Fishes.

Milke.

Sunne, in Summer, and ſpecially in hot countries, draweth milke out of the paps of beaſts and cattell, which being carryed vp in vapours, and reſolued againe into milke falleth downe like rayne.

Blood. After the ſame manner, the Sunne alſo from places where bloud hath beene ſpilt, draweth vp great quantity of blood, and ſo it raineth blood.

Fleſh. It rayneth fleſh, when great quantity of blood being drawne vp, it is clottered together, and ſeemeth to be fleſh.

Auicen. Auicen ſayeth, that a whole calfe fell out of the ayre: and ſome would make it ſeeme credible, that of vapours and Exhalations, with the powre of heauenly bodies concurring, a calfe might be made in the clouds. But I had rather thinke, that this calfe was taken vp in ſome ſtorme of whirlewind, and ſo let fall againe, than agree to ſo monſtrous a generation.

Stones. It is a great deale more reaſonable, that ſtones of earthly matter gathered in clouds, ſhould be generated as wee haue ſaid before of the thunderbolt. Yet ſome men thinke, ỹ wind in caues of the earth breaking vpward violently, carieth before it, earth & ſtones into ỹ ayre, which cannot

long abide, but fall downe, and are counted among prodigious raine. Exhalations that be earthy and drawn out of clay, haue much grosse substance in them, which gathered together, and by great heat burned in the clouds, make bricke, which is no great maruell.

Bricke.

Wheat.

He that hath seene an egges shell full of dew drawne vp by the Sunne into the ayre, in a May morning, will not thinke it incredible, that wheat and other graine should be drawne vp in much hotter countries than ours is, much rather the meale or flowre which is lighter.

Wooll.

A certaine mossinesse, like wooll, as is vpon Quinces, willowes, and other young fruits and trees, is drawne vp of the Sun among the vapours and Exhalations, which being clottered together, falleth downe like locks of wooll.

Quicksiluer.

Quicksiluer, all men know with small heat will bee resolued into most thin vapours, whereof when quantity is drawne vp, it falleth downe againe: As it is read, that once at Rome it rayned Quicksiluer, wherewith the brasen money being rubbed it loked like siluer.

Titus Liuius maketh mention, that it rayned

rayned chalke, whereof the cause cannot be bid to them, that read how stone and bricke come in the ayre. Ghalke. T.Liuius.

Iron hath also rained out of the clouds, and sundry times, as histories witnesse, whereof this hath bin the cause: The generall matter of all mettalles, which is quicksilver and brimstone, with the speciall matter of mixtion, that maketh Iron, were all drawne vp together, and there concocted into the mettall: so came the strange raine of Iron. Iron.

Auicen saith, hee saw a peece of Iron that fell out of the cloudes, that waighed about an hundred pound waight, whereof very good swords were afterwards made. Auicen.

Of Dew.

Dewe is that vapour which in Spring and Autumne, is drawne vp by the Sunne in the day time, which, because it is not carried into the middle region of the ayre, abiding in the lower region, by colde of the night, is condensed into water, and falleth downe in very small droppes. Dew.

There is common dew, and sweet dew.

One

Manna. One kind of the ſweet dewes is called Manna, being white like ſugar, which is made of thick and clammy vapours, which maketh it ſo to fall thicke and white. It falleth onely in the Eaſt parts. As for that Manna, which God rayned to the Iſraelites, it was altogether miraculous.

Plinius. Arabia. In Arabia (as Plinius writeth) is a very precious kinde of dew, that is called Ladanum, which falling upon the herbe Cuſus, & mixed with the wiſe of that herbe which Goates doe eate, is gathered of Goates haires, and kept for a treaſure.

Ladanum. Cuſus.

There is another kind of ſweet dewes, that falleth in England, called the Meldewes which is as ſweet as honey, being of ſuch ſubſtance as honey is: it is drawne out of ſweet herbes and floures.

bitter dew. There is alſo a bitter kind of dew, that falleth upon herbs, and lyeth on them like braune or meale, namely, becauſe it is of an earthy Exhalation, and ſo remaineth, when the moyſture is drawne away: this dew killeth herbes

The common dew drunke of cattell, doeth rotte them, becauſe the matter is full of viſcoſity, bringing them to a ſurfeit.

There be three things that hinder dew from

from falling, that is, great heate, great colo, and wind: for dew falleth in the most temperate calme time.

Of hoare frost.

HOare frost, is or white frost nothing else, but dew congealed by ouer much cold. The South & East wind doe cause dew, but the North and Northern winds doe frieze the vapours: and so it becōmeth hoare frost: which, if that excessiue cold had not bin, should haue turned into dew. Hoare frost.

The dew and the hoare frost agrée in three things, namely, in matter, in quality of time, and place of their generation. In matter they agrée; for they are both generated of a subtill and thinne vapour, and also small in quantity.

In quality of time they consent; for both are made in a quiet and calme time: for if there were great wind, it would driue away the matter, and so could there be no generation.

Thirdly, they are both generated in the lowest region of the ayre, for (as Aristotle affirmeth) vpon high hilles, there is neyther dew nor hoare frost. Aristotle.

They differ also in three things. For the

the hoare frost is congealed, before it be turned into water; so is not the dew.

Secondly, the dew is generated in temperate weather, the white frost in cold weather.

Last of all, hote windes, as ỹ South and East, doe cause dew, but cold winds, as the North and West, doe cause hoare frost.

Hoare frost doth often stinke, because of the stinking matter whereof it consisteth, which is drawne out of lakes and other mudoy and stinking places.

Of Hayle.

Hayle. HAyle is a hote vapour in the middle region of the ayre, by the cold of that regiō, made thicke into a cloud, which falling downe to the sudden cold of the lowest region, is congealed into Ice.

There be so many kindes of hayle, as there be of rayne. The fashion of hayle is sometime round, which is a token, that it was generated in the middle region of the ayre, or very neere it: for falling from high, the corners are worne away.

When the hayle stones are square, or three-cornered, the hayle was generated neere the earth.

Often-

Oftentimes there is heard a great ſound in the clouds, as it were of thunder, before hayle, or of an army fighting, &c. The cauſe is, that vapours of contrary qualities, being incloſed in the cloud, doe ſtriue to breake out, and make a noyſe, euen as cold water doeth, being put into a ſæthing pot.

In ſpring & harueſt time is often haile, ſeldome in ſummer and winter. In winter there want hote vapours; in ſummer, the loweſt region is too hote, to congeale the rayne falling downe. In ſpring and Autumne, there want neyther hote vapours, to reſiſt the cold, nor ſufficient cold to harden the drops of that hote ſhower of rayne.

The hayle-ſtones are ſometimes greater and ſometimes leſſer; greater, with greater cold; and leſſer, with leſſer cold.

There is ſeldome hayle in the night, for want of hote vapours to be drawne vp.

Sometime hayle & rayne fall together, when the latter end of the cloud, for want of cold in the loweſt region, is not congealed.

Hayle-ſtones are not ſo cleare, as Ice, becauſe they are made of groſſe & earthy vapours,

vapours, Yse is congealed of cleare water.

Hayle is soner resolued into water, than snow, because it is of a more sudden and swift generation.

Of Snow.

Snow. Snow is a cloud congealed by great cold, before it be perfectly resolued from vapours into water.

Snow is white, not of the proper colour, but by receiuing the light into it, in so many small parts; as in some, or the white of an egge beaten.

Snow is often vpon high hilles and lyeth long there, because their tops are cold, as they be nere to ỹ middle region of the ayre: for oftentimes it rayneth in the valley, when it snoweth on the hilles.

Originall of Christall Snow melting on the high hilles, and after frozen againe, becommeth so hard, that it is a stone, and is called Christall.

Other matters of snow, because they are common with rayne, are needelesse to bee spoken of. To be short, sleet is generated euen as snow, but of lesse cold, or else beginneth to melt in the falling.

Snow causeth things growing to bee fruitfull, and encrease, because the cold driueth

driueth heate vnto the rootes, and so cherisheth the plants.

Of Springs and Riuers.

The generation of springs is in the bowels of the earth, and therfore some thing must be said of the body of the earth. The earth, though it be solid and massie, yet hath it many hollow gutters & veines, in which is allwayes ayre to auoyd emptynesse: for the ignorant in Philosophy must be admonished, that all things are full, nothing is empty, for nature abhorreth emptinesse, so that where nothing else is, there is ayre and vapours, which by cold, as it hath often been said, will be resolued into drops, as we see experience in marble pillers & such like hard stones, toward raine. This ayre & vapours therefore, being turned into drops of water, these drops sweat out of the earth, and find some issue at the length, where many being gathered together, make great abundance of water, which is called a fountaine or spring. The cause why such springs doe run continually, is because that ayre can neuer want in those veines, which by cold wil alwaies be turned

Springs.

Nothing is empty.

turned into water, so ỹ as fast as the water runeth forth, so fast is aire againe receiued into the place, wherby it commeth to passe, that so many springs are perpetuall, and neuer dryed: but if any be dried vp, it is in a hot Summer, and such springs also they be, whose generatiõ is not deepe in the earth, and therefore the vapors may be made dry, and the earth warme, so the spring may faile.

There be foure kinds of springs, fountaines, brookes, riuers, and lakes.

Of fountaines.

Fountaines. FOuntaines bee small springs, which serue for wels and conduits, when there is but one place, where the water is generated, and that is not very abundant, eyther because it is of small compasse, or smal veines, and not many.

Of Brookes.

Brookes. BRookes, bornes or fordes, be small streames of water, that run in a channell, like a riuer. They are caused when either the spring occupieth a great compasse, or else two or three small springs meet together in one channell.

Of Riuers.

Riuers. RIuers are caused by the meeting together,

gether, not onely of many ſpꝛings, but alſo of many bꝛookes and foꝛds, which being receiued in diuers places as they paſſe, are at the length caꝛied into the bꝛoad ſea foꝛ the moſt paꝛt. Howbeit ſome riuers as ſwallowed vp into the earth, which peꝛchance run into the ſea, by ſome ſecret and vnknowne channels: ſome Riuers there be, that hide their heads vnder the earth, and in another place, faꝛ off, bꝛeake out againe. They wꝛite alſo, that ſome Riuers being ſwallowed vp of the earth, in one Iland doe run vnder the bottome of the earth and ſea, and bꝛeake foꝛth in another Iland. There be alſo many great Riuers, that run vnder the earth in great caues, which neuer bꝛeake foꝛth. Ariſtotle ſheweth of ponds and lakes, that be vnder the earth. And Seneca ſpeaketh of a pond, that was found by ſuch as digged in the earth, with fiſhes in it, and they that did eat of them, dyed. As Eeles that bee found in darke places, as welles that haue beene dammed vp. &c. are poyſon. Ariſtotle. Seneca.

Of Lakes.

LAkes are made by the meeting together of many Riuers, bꝛookes and ſpꝛings into one deepe valley: whereof, ſome are ſo great, Lakes.

great, that they haue the name of seas, as the great lake called Hircane, or Caspian sea. These lakes sometimes vnlade themselues into the sea, by small riuers, sometimes by passages vnder the earth.

The cause of the swiftnesse of riuers, is double: for they are swift, eyther for the great abundance of waters, or else because they run downe from an hilly place, as the riuer Rhene falleth downe from the top of wonderfull high hills.

Of hot bathes.

Hote baths. SOme waters, that are generated & flow out of veines of brimstone, are sensibly warme, and some very hot, because they run out of hot places. These waters being also drying by nature, are wholesome for many infirmities, specially breaking forth of scabs, &c. Such are the baths in the West countrie, and S. Anne of Buckstones well in the North part of England, and many other elsewhere.

Of the divers tastes that are perceiued in welles.

Tastes of waters. FOr a general reason, the waters receiue their taste of that kind of earth, thorow which

which they rune, as thorow a strayner. Some salt, that run thorow salt veines of the earth: some sweet, that be well strayned, or run thorow such minerals as bee of sweet taste: some bitter, that flow out of such earth, as is bitter by adustion or otherwise.

Some sowre or sharpe, like vineger, which rune thorow veines of Allome, coperus, or such minerals. Aristotle writeth of a well in Sicilia, whose water the Inhabitants used for vineger. Aristotle. Well water used for vineger.

In Bohemia, neere to the city called Bilen, is a well that the people use to drink of in the morning, in stead of burnt wine. Bohemia.

And in divers places of Germany bee springs, that taste of such sharpenesse.

Some have the taste of wine, as in Paphlagonia is a well, that maketh men drunke, which drink thereof: which is, because that water receiveth the sunnesse of brimstone, and other minerals, thorow which it runneth, and so filleth the braine as wine doth. Paphlagonia

A receitall of such rivers and springs, as have marveilous effects, whereof no naturall cause can be assigned by most men, although some reason in a few may be found.

Marveylous water. Clitumnus. Propert.

CLitumnus, which maketh oxen that drink of it, white, is a riuer or spring in Italy, Propert. lib. 2. This may be the quality of the water, very flegmatike. In

Boetia. Melas.

Boetia is a riuer called Melas that maketh sheep black, if they drinke thereof.

Seneca.

Seneca speaketh of a riuer that maketh red hayres. These two with the first, may haue some reason, that the quality of the water may alter complexion, and so the colour of haires may be changed as we see in certaine diseases.

Libia.

In Libia is a spring, that at the Sunne rising and seting, is warme; at mid day cold, and at mid night, very hote This may be, by the same reason, that wel-water is colder in Summer, than it is in winter. Seneca writeth, that there be riuers, whose waters are poyson: this may be naturally, the water runing thorow poysonous mineralls. taking much fume of them. Other wels that make wood and all things else that be cast into them, stones: such welles be in England, the cause is great cold.

Seneca.

Another well maketh men mad that drinke thereof. This also may haue as good reason, as that which maketh men

drunke:

drunke: As also that well, which maketh men forgetfull by obstruction of ỹ braine.

The same Seneca speaketh of a water, that being drunke, prouoketh vnto lust & lechery. And why may not that quality be in a water, which is mixed with diuers minerals and kinds of earth, which is in herbes, rootes, fruits and liquours?

S. Augustine speaketh of a well in Egypt, in which burning torches are quenched, & being before quenched, are lighted. S. Augustine

Among the Garamants is a well, so cold in the day, that no man can abide to drinke of it: in the night so hote, that none can abide to feele it. Garamants.

It is incredible, that is written of a well in Sicilia, whereof if theeues did drinke, they were made blind. Sicilia,

In Idumea was a well, that one quarter of a yeere was troubled and muddy, the next quarter bloudy, the third greene, and the fourth, cleare. Idumea.

Seneca writeth of another well, that was fiue houres full and running ouer, and fiue houres decreasing & empty: perchaunce, because it ebbed and flowed with the sea, or some great Riuer that was neere it. Seneca.

Anthracius. In the hill Anthracius, is sayd to bee a well, which when it is full, signifieth a fruitfull yeere, when it is scarce and empty, a barren and deare yeere. The sufficiency of moysture maketh fertility, as the want causeth the contrary.

Hungaria. Men say, there is a riuer in Hungary, in which Iron is turned into Copper: which may well be, seeing inke, in which is but small coperus, and artificially mixed, of Iron, doth counterfeit copper in colour. In this streame may be much coperus, and that is naturally mixed.

Seneca. Theophrastus. Both Seneca and Theophrastus witnesse, that waters there be, which within a certaine space, being drunke of sheepe, (as Seneca sayth) or of birds (as Theophrastus will haue it) changeth their colours from blacke to white, and from white to blacke.

Vitruuius. Arcadia. Nonacrinis. Vitruuius writeth, that in Arcadia is a water called Nonacrinis, which no vessell of Siluer, Brasse, or Iron, can hold, but it breaketh in peeces, and nothing, but a Mules hoofe, will hold it and containe it.

Illyria. In Illyria, garments that are holden ouer a most cold Well, are kindled and set

set on fire.

In the Ile of Andros, where the Temple of Bacchus stood, is a Well, that the first day of January flowed wine. Andros. Bacchus.

Isidore saith, there is a Well in Italy that healeth the wounds of the eyes. Isidorus.

In the Ile of Chios is a well, that maketh men dull-witted, that drinke thereof. Chios.

There is another, that causeth men to abhorre lust.

Lechnus, a Spring of Arcadia, is good against aboртions. Lechnus.

In Sicilia are two Springs, of which one maketh a woman fruitfull, and the other barren. Sicilia.

In Sardinia be hote Welles, that heale sore eyes. Sardinia.

In an Ile of Pontus, the River Astares ouerfloweth the fields, in which what soeuer sheepe be fedde, doe alwayes giue blacke milke. Pontus, Astares.

In Aethiopia is a Lake, whose water is like oyle. Aethiopia.

Also, many Springs of oyle haue broken forth of the earth, which commeth of the viscosity or fatnesse of ỹ same earth.

The Lake Clitorie, in Italy, maketh men that drinke of it, to abhorre wine. Clitorius.

Pentasium. Solinus. The lake Pentasium (as Solinus sayth) is deadly to serpents, & wholsome to men.

Seneca writeth of certaine lakes that will beare men, which cannot swimme.

Syria. And that in Syria is a lake, in which bricks doe swimme, and no heauy thing will sinke.

Rhenus. It is said, that the riuer Rhene in Germany will drowne bastard children that be cast in it, but driue aland them that bee lawfully begotten.

Hypanis. Sythia. The riuer Hypanis in Sythia, euery day brings forth little bladders, out of which flies doe come that dye ỹ same night.

Matrona. Matrona the riuer of Germany, as the common people saith, neuer passeth day, but he taketh some pray.

Of the Sea.

The Sea. THe sea, in this treatise, hath place as a mixed substance: for else the element of waters being simple, were not here to be spoken of.

The natural place of the water. The sea is the naturall place of the waters, into which, all riuers and other waters are receiued at the length.

And here it is to be vnderstood, that the very proper and naturall place of the water,

ter were to couer al the earth, for so be the elements placed: the earth lowest, and round about the earth the water, about the water, the aire, and about the aire, the fire. But God the most mighty and wise creator of all things, that the earth might in some parts be inhabited of men and beasts commanded the waters to bee gathered into one place, that the dry land might appeare, and called the dry land, earth, and the gathering of waters, he called seas. Gen. 1.

In the sea, are these two things to be considered, the saltnesse, and the ebbing and flowing.

Of the saltnesse of the Sea.

The saltnesse of the Sea, according to Aristotles mind, is caused by the Sun, that draweth from it, all thinne and swæt vapours, to make raine, leauing the rest, as the setling or bottome, which is salt. But men of our time, peradventure more truely, doe not take this for the onely and sufficient cause, to make so great a quantity of water salt, but say, that the Sea, by Gods wisdome is gathered into such valleyes of the earth, as were otherwise barren and vnfruitfull; such earths Aristotle.

are

are salt, the sea water then mixed with that earth, must nœds be salt, else riuers by Aristotles mind, should be salt, as well as the sea. The Reader may chose which opinion is most probable.

Of the ebbing and flowing.

Ebbing and flowing. Aristotle.

The ebbing and flowing of the Sea, as Aristotle seemeth to teach, is by reason of Exhalacions that be vnder the water, which driue it to and fro, according to contrary bounds and limits, as vpward and downeward, wide and narrow, deepe and shallow. This opinion of Aristotle also, is more subtill than true: experience teacheth men to mislike, and to ascribe the cause of ebbing & flowing, to the course of the Moone, which ruleth ouer moysture as the Sunne doth ouer heat: for from the new Moone, to the full, all humors do encrease & from the full to the new Moone, decrease againe. Also, the very true time of the ebbing and flowing, may be knowne by the course of the Moone, with whom, as the Lady of moysture, we will close vp the fourth booke of moyst and watry impressions.

The

The fift Booke, of earthly Meteors, or bodies perfitly mixed.

This last Treatise contayneth such bodyes, whose chiefe matter is the earth, and are called perfitly mixed, because they are not easily resolved into the chiefe matter wherof they are generated. These are divided into foure kindes. The first be divers sorts of earth: the second bee liquors concreat: the third be metals and metallikes: the fourth be stones. This division is not altogether perfect, both for that there bee many of these minerals, which partake of two kinds, and also for that the names of some of these kinds may be sayd of other. Yet minding as playnly as can be, to declare the things thēselves, the controuersy and cauillation of names shall not greatly trouble vs, especially seeing we prētēd not to teach Philosophers, but such as nēd a ruder & plainer instruction. They may therefore be content wᵗ this diuision, which shall not serue them to dispute of these matters, but to vnderstand ẏ truth

Earthly bodies.

truth of these things that they desire. Of these foure therefore, we will speake orderly & generally, not minding to intreat of everie particular kinde (for that were infinite) but to open such vniuersall causes, as they which haue wit, may learne, (if they list) to apply vnto all particulars.

Of earths.

Of earths. The earth is an element, one of the foure, cold and dry, most grosse and solide, most heauy and waighty, the lowest of all other in place. When I say an element, I meane a simple body vncompounded. This earth is no Meteor, but as it was shewed in the water, to the end there should be generation of things. There is no element that we can haue, which is pure and simple, but all are mixed and compound. Our fire is grosse and compound; so is our ayre, our water, and our earth: but the earth, notably and aboue the rest, is mixed. For the pure and naturall earth is dry and cold: but we see much to be moyst, and much to be hote. The naturall earth is blacke of colour: but we see many earths white, many yellow, and many redde. So that first, the greatest

part

part of the earth is mired with water, that maketh it to cleaue together, with ayre & some fire, which make an oyly, fat, or clammy earth, as is clay made, &c.

Another great part is dried, not into the naturall drinesse of the first quality, but as a thing once mired, and after dried, either by the cold, as sand, grauell, &c. or else by heat, as chalk, oker, &c. And yet somewhat more plainly and particularly to discourse vpon these causes, admitting the naturall colour of ỹ earth to be black, of the water to be blue, of the ayre to be white, and of the fire to be ruddy, it followeth, that vpon the mixtion of these colours, or chiefe domination of them, all things haue their colour.

The grosse substance of the earth therefore, being diuersly mired with other elements, and those mixtures againe being eftsoones altered, by diuers, and sometime contrary qualities, hath brought forth so many kindes of earth, as clay, marle, chalke, sand, grauell, &c. Clay is mired with fat moysture, taking his colour of the mixture with red frō white, but being cold, it is not so fruitfull as marle, which is not alwaies so moyst as it. Chalk is an

earth

earth by heate concocted, after diuers mixtions, and dried vp. Oker, both yellow and red, with such like, are of ỹ same nature, with mixtion of red, more or lesse.

Sand and grauell, are dryed earths, as it were frozen by cold: grauell is grosse and apparent; sand, though it be finer, is of the same generation, consisting of many small bodies, which are congealed into stones. Sand seemeth to be clay, dryed by cold, & coacted together into small stones, whereof some are thorow shining, which were the moist parts; the thicke were of the grosse part: the same is grauell, but of greater stones consisting. The like iudgement is to be giuen of all other kindes of earth, whose generation, by the similitude of these, will not be very hard to find out. They that list to know the diuers kindes of earths, must haue recourse to Plinius, Cardane, and other writers, that receite a great number of them: but these are the chiefe and most common kindes

Plinius.
Cardanus.

Of liquors concreate.

WE take not liquors concreat so largely, as the word doeth signifie: for then should we comprehend both ỹ other kinds follow-

following. But only those liquors, called in Latine, Succi, which are, as it were middle betweene metals and stones, of which, some being fat and oylie, doe burne as Brimstone, Sea-coales, Ieat, Bitumen, &c. and the kindes of all these. Othersome doe not burne, as Salt, Allum, Coperus, Saltpæter, &c. and ỹ kinds of these.

Of the first sort, which are generated of earthy and ayrie vapours, fumes & Exhalations, the chiefe and most notable, is Brimstone, which seemeth to be the matter of all dry and hot qualities, that are in earthly Meteors. The rest are generated of such like vapours as Brimstone is, but then they be diuersly mixed: as ỹ coles haue much earth mixed with Brimstone: Ieat seemeth to be all one but better concocted than coles. Of Amber is great contention, whether it be a minerall, or the sperme of a Whale: for it is found in the sea, cast vp on the shore. Now the Whales seed, being of ỹ very same qualities is taken more & lesse concreate of diuers hardnes; some almost as hard as Amber; some softer, and some liquid: yet Cardan plainly defineth, ỹ Amber is a minerall. Whether he haue reason or experience, contrary to ỹ vulgar Cardanus.

opinion,

opinion, let them consider that list to contend. These minerals that will resolue with fire, it is apparant, that they were concreate with cold: in that they burne, it is manifest, they haue a fat and clammy substance mixed with them, as the other kind hath not. which will not resolue so well with fire, as with water; which be salt, coperus, saltpæters, &c. These burne not, being watry, earthy, and not fat, vnctuous nor clammy.

These be of diuers colours, black, as Coles, and Jeat, because there is much earthy substance mixed with their sulphurous matter. Some be sheere, as Salt, and Allome, hauing a substance watry, dryed, and concreate. Coperus is greene because it hath much cold matter that is blue, mixed with it. Salt, the most common and necessarie of all these liquors concreat, that be moist and not fatty, hath two manner of generations one naturall, and the other artificiall. The naturall generation, is, when it is first generated in the earth, after commeth the water of the Sea, and is infected with it; out of which the Salt is againe artificially gathered. Of these liquors concreat, bee

those

those strange wels and springs infected, of wich was spoken in the latter end of the fourth booke. Most notably brimstone causeth the hote bathes, and burneth in Aetna of Sicilia, and Vesuuius of Italie, casting vp the Pumise stones, of which is no place here to entreat. Aetna and Vesuuius.

Of Metals.

METals be substances perfitly mired that will melt with heat. and be brought into all manner of fashions that a man will. Of these the Alcumists say, there be seuen kinds, to answer to the seuen Planets: Gold, Siluer, Copper, Tynne, Lead, Iron, and Quicksiluer that they call Mercurie. But sauing their authorities, Quicksiluer is no more a metall, than Brimstone, which is as necessary to the generatiō of metall, as quicksiluer is. For they all agrée, that all metalles are generated of Sulphur, that is, Brimstone: which because it is hote, they call, The father; and Mercurie, that is, quicksiluer, which because it is moyst, they call, The mother. So by as good reason, may they call Brimstone a metall, as Mercurie. Then there rem- Metals. Mercurie.

neth but six perfit metals, Gold, Siluer, Copper, Tynne, Lead, and Iron.

Of Gold.

Gold.

That most vnprofitable and hurtfull of all metals, Gold, which most men dispraise, & yet all men would haue, is of all other metals the rarest, it is onely perfit, all other be corruptible. Gold neuer corrupteth by rust, because it is pure frō poysonous infection, and most solide, that it receiueth not the ayre into it, which causeth all things to corrupt. It is perfitly concocted with sufficient heat, and mixture of Sulphur: all other metals, either are not so well concocted, or else they haue not the due quantity of brimstone. This opinion hath also place among the Alcumists, that because nature in all her workes seeketh the best end, she entendeth of all metals to make Gold: but being let, either for want of good mixture, or good concoction, shee bringeth forth other metals, indeed not so precious, but much more profitable: and ye lesse precious, ye more profitable: for there is more use to the necessity of mans life, in iron and lead, than is in gold and siluer. But either the beauty, or the perfection, or

Why Gold rusteth not.

The opinion of the Alcumists.

at

at leastwise the rarenesse of gold and siluer haue obtained the estimation of all men, so that for them is sold all maner of things holy and prophane, bodily and spirituall. What paines doe not men take to winne gold? euery man hath one way or other to hunt after it: But the Alcumist despising all other wayes, as slow, vnnaturall, and vnprofitable, laboureth, either to helpe nature in her worke, as of vnperfit metals to make perfit, or else to force natore to his purpose, by his quintessences & elixors, so ỹ what by purging, whatby concocting; what by mixing of sulphur and quicksiluer and much other like stuffe, at length hee turneth the wrong side of his gowne outward, all the teeth out of his head, and his body from health to a palsey, and then hee is a Philosopher, and so he will be called.

Of Siluer.

SIluer, the most pure metall next vnto gold hath indifferent good concoction in the earth, but it wanteth sufficient heat in the mixture, that maketh it pale. It is found (as they say) running into diuers veines, as all other metals be, but this most specially, after the shape and fashion Silver.

of a tree, lying along with a body or stock, of proportion like to the bodie of a tree, also with armes, branches, leaues and fruites. This metall, Siluer, lacketh sufficient heate, and therefore commeth neither to the colour soliditie, nor perfection of Gold, and is generated in cold countries, neere vnto the North and South poles, in so great quantitie, that the husbandmen, when they plow their ground, turne vp siluer among the clots in their daily labours, which they doe hide and conceale, lest the greedy Princes, for couetousnesse of the metall, should ouerturne and destroy their land.

The Gold mines are contrariwise most found in the hot countries of India and Aethiopia, because in them is sufficien. of heat, for that vnhappie generation.

This siluer also, the Alcumists would faine make by Arte: but Mercurie the chiefe Master of the worke, is so subtil and so slye, that nothing can holde him, nothing can kill him: for if the glasse be not very thicke, hee will soone breake out of prison, and so there is nothing left.

Of

Of Copper.

COpper, in colour, comming nereſt to Gold, being not ſolid nor mallie, (for of all metall, gold is the heauieſt) giueth way to corruption, being infected with that greene minerall Copperus. Hereof be diuers kindes, braſſe, latine, and ſuch like, which differ in digeſtion: the Copper being pureſt, is of beſt digeſtion, and nereſt vnto Gold; and ſo the reſt in like degrees.

Copper is moſt like to ſiluer in the waight, and in the hammering, wherefore the Alcumiſts haue learned to make it white, ỹ it deceiueth mens ſight and handling: but the Goldſmiths doe eaſily try it, and by the taſte of counterfeit ſiluer, make copper again. Copper or braſſe doth alway grow neere to ỹ mine of Copperus, which running with it in the digeſtion, or natural concoction, hinderyth it of perfectio, maketh it to ſtink, and to be eaten of a greene ruſt. much adoe the Alcumiſts haue to turne it into gold, if it might be, they diſpute very reaſonably and conclude almoſt neceſſarily in their talke, that it may be conuerted into gold, as a body that wanteth little of

perfection, which may be easily added vnto it. But in conclusion of the worke, it is an harder matter to bring it to passe, than it was to purpose, before they had done it, to build an Abbey at euerie miles end, vpon Salisburie plaine, as one was minded.

Of Tinne.

Tinne. TInne, whereof great plenty groweth in the West parts of England, in beauty and colour commeth nèerest to Siluer, and of siluer wanteth nothing but solidity and hardnes: for tinne is raw & vndigested metall, also very porose & vncompact, which causeth it to crash, when it is broken or bitten: so it fayleth of heate in the commixtion, & also sufficient digestion in the earth: otherwise it is a faire & profiable metall, to serue the vse of them vnto whom siluer and gold are not so plentifull.

Of Lead.

Lead. LEad also, found in great abundance within this Realme, is a raw & vndigested metall, as tinne is, but yet of better digestion than commixtion: for it is mixed with a grose earthy substance, which maketh it to bee in colour so black and so folvle to corrupt: so that of the same fumes and

and Exhalations, (which if they had bene pure and well digested, if the place and matter would haue suffered, should haue bene concreate into siluer) for lacke of the same, lead is generated, which comming plentifully, doth better seruice than siluer.

Of Iron.

Iron, the most necessarie and profitable of all other metals, (& yet as ill vsed of many, as any other, is generated of such substance as siluer is, but mixed with a red mineall, which eateth it with red rust, & also being of too extreame digestion passing all other metals in hardnes. And as other metals, to the perfection of siluer, want sufficient concoction, whereby they come not to the same hardnesse: so Iron passeth and exceedeth siluer in immoderate digestion. But though it come not to the perfection of siluer, God forbid, that all Iron had bene turned into siluer; for then we should more haue missed it, than siluer or gold, the want of which would hinder vs no thing at all. Iron.

Of Quick-siluer.

Though Quick siluer be no metall, yet because it is the mother of all metals, something is here to be spoken of it. Quick-siluer.

There bee diuers and sundry opinions, both of the generation, and also the qualities of it, which make the generation to bee hard to find out. For if the quality were certainly agreed upon, there were an easier way found, to try out the generation. Some affirme, that it is exceeding hote, and that they would proue by the swift pearcing thereof into other things that be porole.

Other say, it is exceeding cold and that they proue by the exceeding waight of it. As for the pearcing, they say, it is caused of the exceeding moystnesse, of which quality both parts doe graunt that it is Concerning the generation, some haue sayd, that it is pure & elementall water: some againe haue thought, that it droppeth out of heauen, and is a part of the heauenly substance. And other sayd, that it is generated in the clouds, and falleth downe in the field, in a circle, on those round circles, which are seene in many fields, that ignorant people affirme to be the rings of the Fairies dances. It is certaine, ỹ quicksiuer hath diuers times fallen out of the clouds, as wee haue declared in the treatise of wonderfull & marueylous raine: but

but whether it so fal in circles it is doubtfull. The most probable opinion is, that it is generated of moyst vapours of the earth, coacted by cold, much like to water, as Brimstone is of hote fumes coacted by cold, much like to fire And thus much of metals.

Of Stones.

Stones. STones, the fourth kinde of earthly mired bodies, haue two maner of generations, by most contrary qualities for heat doth harden moist bodies into stones, as we see, that of clay, it maketh exceeding hard bricke.

Also the thunderbolts in the clouds, are generated by heat, as before hath beene shewed. But cold doth by congealing, generate many more stones than heat doth, for the most part of all the stones that are digged out of the earth, are generated by cold, which is able to conuert any other kind of mired substance into stone, as hath beene partly shewed in the nature of wels and springs, of which, there be some in England, which by their colde, turne wood, or any like thing into stones. I haue

haue seene a peece of rotten wood, which to sight was very light, and like wood, but in handling, a very stone that was taken out of such a well. Also of other things taken out of the earth, turned into stones, I haue seene and found my selfe, flyes, with head and wings very hard stones, also, I haue seene a heart, a birds tongue, a beasts stone, a peare, a plumme: and diuers other things turned into hard stones.

Of the divers kinds of stones.

STones may first bee diuided into rude and beautifull: the rude contayne those great rocks, which are generated by many small parts ioyned together, and the common pibble stones, that be found euery where in the earth, among grauell, and on the shore of the sea, or banks of the riuers. These are generated of grosse and earthly humours, congealed by cold, and because they be neyther faire of colour, nor throughout shining, and also common, they are contemptible. The faire or beautifull stones, be either great or small. The great be, as marble of diuers kinds and colours, alabaster, and such like, which being hard and well concocted, may be polished and become

Rockes.

Pibble stones.

Marble.

become beautifull. Their colour is as they are mixed being vncongealed, so is their pureneſſe. The ſmall are more pretious, and they be either thick or pellucide. The thick be neither ſo faire nor ſo precious, as the Achates, the Iaſper, Praſſios, &c. These conſiſting of a pure matter, and not very watry, are congealed into ſuch ſtones. The cleare ſtones be liquors concreate, as the Diamond, the Saphir, the Emerald, &c. they are praiſed of their greatneſſe hardneſſe, clearneſſe, & faire colours, of which enough hath bin ſpoken, ſauing that ſome be of opinion, that theſe be generated by heat, becauſe the beſt are found in hot countries, in the Eaſt, and in the South. Anſwere may be made, that the hotter the ayre is, the colder is the earth: ſo that reaſon is of ſmale force.

Achates. Iaſper. Praſſios.

Diamond. Saphir. Emerald. The praiſe of precious ſtones.

Of the vertue of ſtones.

SOme perchance, would looke that wee ſhould make a long diſcourſe of the vertue of ſtones, & would be well content that we ſhould entreat of diuers properties of gemmes & precious ſtones, which matter though it be out of our purpoſe (which conſidereth only ȳ generation) yet ſeeing it

The vertue of ſtones

is

is not out of their expectation, some thing briefly, and yet sufficiently shall be said of he vertue of stones.

The vertue of stones either natural or magicall.

That vertue that is ascribed vnto them, is either naturall, or magicall. Naturall vertue is either that which is knowne to haue a naturall cause, or a naturall effect, as the Magnes, or Load stone, to draw Iron, which is by a similitude of nature, and such an appetite, as is betweene the male and the female. Also, the said Magnes moueth toward the North, & as some say, there is another kinde, found in the South, that draweth toward the South. They say, that there are great hils of this stone in the North and South, which maketh it looke that way.

Magnes.

Other bring a Mathematicall reason, which because it is more curious, than can be vnderstood of the common sort, not exercised in Geometry, I omit.

Ieat and Amber draweth chaffe.

The Ieat and Amber draw hayres, chaffe, and like light matter, but being before chafed; for heat is attractiue.

Astroites, a stone moueth in vineger.

Also the precious stone called Astroites, moueth it selfe in vineger, the sharpnesse of the vineger pearcing it, and the ayre excluded, driuing it forward. These

vertues

vertues because I haue seene, I haue set for an example: generally all other like naturall vertues, proceede of like naturall causes which by their effect, the ingenious must seeke to finde out. As for magicall vertues, be they, which are grounded of no reason, or naturall cause, which if they take effect, it is rather of the superstition & credulity of him that vseth them, than of the vertue of the stones. As that an Emerald increaseth loue, a Saphir fauour, a Diamond strength, and such like vertues, of which Albertus in his age, surnamed the great, toke paines to write a booke, which I suppose to be englished. To conclud with the cause why stones melt not, as metals doe, may be gathered, by that which hath bin said before, because they are congealed past that degree, and also because there is left in them, no vnctuous, or clammy matter. Let this suffice for stones: and so the whole purpose is at an end.

Albertus Magnus.

FINIS. D. Fulke.